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Bathyal and Abyssal Gammaridean Amphipoda of Cedros Trench, Baja California

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FRANK A. TAYLOR
Director, United States National Museum

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Bathyal and Abyssal Gammaridean Amphipoda of Cedros Trench, Baja California

Introduction

Collections of bathyal and abyssal gammaridean Amphipoda were obtained in nine benthic and one epibenthic samples from Cedros Trench, Baja California, by Dr. R. J. Menzies, now of Duke University. The benthic samples were collected in 1960–61 with a Menzies trawl from the R/V *Velero IV* of the Allan Hancock Foundation, University of Southern California. Deep-sea samples collected by Dr. Robert H. Parker, during the "Baja Slope Expedition" of Scripps Institution of Oceanography, from waters to the west of Baja California, 250 miles south of the Cedros Trench, also have been analyzed; they include some remarkably large species newly recorded from the northeastern Pacific Ocean. A sample of Amphipoda collected in a benthic hagfish trap by Dr. Theodore R. Folsom, off California, to the north of Cedros Trench, is also included because of its singularity. Analyses of the Amphipoda are presented herein. Station data and a faunal list are given on pp. 3–5.

The name "Cedros," like the Guatemala Trench to the south, is applied to a short portion of the west American trench which borders the continental margin. Cedros Trench lies in the vicinity of Cedros Island, off the middle coast of Baja California, at approximately 28° N latitude.

Few records of bathyal and abyssal Amphipoda from this or any portion of the eastern Pacific Ocean have been published. Those works of concern to this area are records of *Albatross* material made by Holmes (1908) from middle and southern California, Shoemaker (1925) from the Gulf of California, and J. L. Barnard (1964d) from Alaska to Peru; *Galathea* collections from Panama by J. L. Barnard (1961); *Velero IV* collections from canyons and basins of California

by J. L. Barnard (1966a); and additional North Pacific records by Shoemaker (1964).

The Menzies trawl (Menzies, 1962) is designed to collect small motile crustaceans and its success may be measured by the large number of small amphipods, many newly described, which have been collected in so few samples.

Composition of the Samples

The eight samples with the most numerous specimens occur in depths from about 800 to about 4400 m. The recovery of various familial groups is highly erratic. For instance, ampeliscids and phoxocephalids are sparse or absent in samples 7234 (791 m) and 7230 (2706 m) but they are abundant in all samples from depths between these extremes. Oedicerotids and synopiids are also erratic in occurrence. Several genera and species sporadically occur in different samples and 18 species of the total of 81 collected are represented by single specimens. Nevertheless, the number of species is high in some samples, station 7229 (1748 m) yielding 38 species. These facts indicate that the amphipod fauna of bathyal and upper abyssal depths is rich and diverse. Many more species are expected to be found in future explorations of this study area. Perhaps a dozen species, which have not been described here because of their fragmentary condition, occur in the samples. Oedicerotids and lepechinellids particularly are subject to severe damage during washing of sediments after sampling.

The number of Amphipoda per sample decreases with increments in depth, but this may reflect to some extent the increased difficulty of keeping the trawl on the bottom in great depths.

There is virtually no relationship of the fauna recovered in the Cedros Trench to that of nearby coastal shelves (see lists of species in J. L. Barnard, 1964c, 1966b). Barnard (1966a) has discussed the dissimilarities between bathyal faunas of submarine canyons and those of the southern Californian shelf. Only *Prachynella lodo*, *Pardisynopia synopiae* of station 7234 (842 m) and the eurybathic *Argissa ?hamatipes* of station 7229 (1748 m) occur on the deep portions of the coastal shelf and only the genera *Ampelisca*, *Byblis*, *Lembos*, *Liljeborgia*, *Metaphoxus*, *Monoculodes*, *Orchomene*, *Paraphoxus*, *Phoxocephalus*, and *Rhachotropis* have representatives on the coastal shelf. Only the species of *Metaphoxus* and *Phoxocephalus* appear to have any direct relationships with their sublittoral congeners, but interspecific morphological differences in these genera are so small that even these relationships are uncertain.

Barnard (1966a) concluded that the upper bathyal fauna of submarine canyons and borderland basins of southern California has the aspect of a submergent fauna of northern latitudes but the samples at hand ameliorate the strength of that conclusion. Some species and genera show a relationship to sublittoral cold-temperate and subarctic faunas, as follows, *Aceroides* spp., *Bathymedon* spp., *Paraphoxus oculatus*. But others, such as *Phoxocephalus kergueleni*, *Aristiopsis tacita* and species of *Oediceroides*, show a relationship to southern hemisphere faunas. *Leptophoxus falcatus* and *Monoculodes latissimanus* have affinities with the fauna of high north latitudes but populations of those species also occur in bathyal or abyssal waters of high latitudes. The remaining species, of which a large proportion is new, have their affinities with bathyal and abyssal faunas of seas in low latitudes, thus suggesting the universal distribution of discrete bathyal and upper abyssal faunas having little relationship to polar sublittoral waters.

I am indebted to Dr. John S. Garth of the Allan Hancock Foundation for making these collections available to me. Mrs. Dorothy M. Halmos, Librarian of that foundation, assisted me with reference problems. Some figures were drawn by Miss Jacqueline B. Hampton and the Misses Vivienne and Rosalind Noon, and the remainder by the author. All were inked by Miss Elaine R. Taylor. Assistance for illustration was provided by the National Science Foundation (G–10750). The author is grateful for the aid of these persons and agencies.

Through discussions, letters, and a manuscript revising portions of the Lysianassidae, the author has been aided by Dr. D. E. Hurley, New Zealand Oceanographic Institute, in composing the classificatory remarks on that family.

Dr. Meredith L. Jones of the Smithsonian Institution identified the remains of polychaetes in the stomach of *Parandaniexis mirabilis*.

Station List

(Taxa are listed alphabetically by genus. Those in parentheses are known to be obligatorily pelagic in habitat. All materials in Allan Hancock Foundation, except *=in Smithsonian Institution, **=in Copenhagen Museum.)

Station 7228. 27°37′17″ N, 115°49′16″ W, 3718–4392 m, Dec. 30, 1960.

Ampelisca coa 1; *Harpiniopsis excavata* 2; *Vemana lemuresa*, new species, 1.

Station 7229. 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Aceroides edax, new species, 2; *Ampelisca coa* 2; *A. macrocephala unsocalae* 2; *Argissa hamatipes* 1; *Austrosyrrhoe ilergetes inconstans*, new subspecies, 4; *A.*

priscis, new species, 1; *Bruzelia ascua*, new species, 8; *B. inlex*, new species, 29; *Bathymedon covilhani* 2; *B. flebilis*, new species, 2; (*Cyphocaris anonyx* 2); *Harpiniopsis emeryi* 1; *H. excavata* 3; *H. fulgens* 5; *H. naiadis* 4; *H. petulans* 4; *H. profundis* 2; *Lepechinella arctica turpis*, new subspecies, 1; *Monoculodes diversisexus*, new species, 12; *M. latissimanus* 2; *M. necopinus*, new species 7; *Oediceroides abyssorum* 2; *Orchomene tabasco*, new species, 2; *Paraphoxus oculatus* 1; *Pardalisca* species 1; *Pardaliscopsis* (*?*)*tikal*, new species, 6; *Pardisynopia ?synopiae* 1; *Phippsiella pajarella*, new species, 1; *Phoxocephalus kergueleni* 5; *Pseudotiron longicaudatus greteus*, new subspecies, 1; *Rhachotropis ludificor*, new species, 1; *R. multesimus*, new species, 1; *Schisturella grabcnis*, new species, 16; *S. robusta cedrosiana*, new subspecies, 1; stegocephalid 1; *Syrrhoites cohassета*, new species, 3; *S. redox*, new species, 2; *Uristes perspinis*, new species, 2.

Station 7230. 27°52′25″ N, 115°44′30″ W, 2667–2706 m, Dec. 31, 1960.

Ampelisca plumosa 1; *Bathymedon nepos*, new species, 2; *Harpiniopsis excavata* 3; *H. fulgens* 1; *Lepechinella arctica turpis*, new subspecies, 2; *Metaphoxus simillimus*, new species, 1; *Pseudotiron coas*, new species, 2; *Schisturella abyssi* 1; *Urothoides inops*, new species, 3.

Station 7231. 27°24′00″ N, 115°12′15″ W, 2398–2475 m, Jan. 1, 1961.

Acercoides edax, new species, 1; *Acidostoma obesum ortum*, new subspecies, 2; *Ampelisca coa* 2; *Aristias expers*, new species, 1; *Bathymedon candidus* 14; *B. flebilis*, new species, 1; *Byblis* species 3; *Bruzelia inlex*, new species, 3; *Harpiniopsis emeryi* 3; *H. excavata* 1; *H. fulgens* 1; *H. naiadis* 1; *H. profundis* 8; *Monoculodes latissimanus* 9; *M. recandesco*, new species, 1; *Paraphoxus oculatus* 2; *Pardaliscopsis* (*?*) *copal*, new species, 1; *Photis* (*Cedrophotis*) *malinalco*, new species, 2; *Phoxocephalus kergueleni* 1.

Station 7234. 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

Aristiopsis tacita 1; *Austrosyrrhoe priscis*, new species, 1; *Byblis teres*, new species, 2; *Harpiniopsis epistomata* 3; *Lembos edentulus*, new species, 1; *Tryphosella metacaecula*, new species, 1; *Leptophoxus falcatus icelus* 4; *Monoculodes diversisexus*, new species, 1; *M.*(*?*) *sudor*, new species, 1; *Paraphoxus oculatus* 2; *Pardisynopia synopiae* 1; *Phippsiella viscaina*, new species. 5; *Prachymella lodo* 1; *Rhachotropis ?cervus* 2; *R. clemens*, new species, 3; *Stegocephaloides camoti*, new species, 1; *Syrrhoites silex*, new species, 2; *S. trux*, new species, 8.

Station 7235. 27°42′30″ N, 115°25′55″ W, 1248–1292 m, Jan. 2, 1961.

Ampelisca amblyopsoides 1; *A. furcigera* 1; *A. plumosa* 1; *A. pugetica mora*, new subspecies, 1; (*Cyphocaris anonyx* 2); *Harpiniopsis epistomata* 1; *H. excavata* 1; *H. profundis* 4; *Liljeborgia cota* 1.

Station 7249. 27°36′25″ N, 115°56′25″ W, 3705–3745 m, Jan. 4, 1961.

Ambasiopsis(*?*) *fomes*, new species, 1; *Oediceropsis* (*Paroediceroides*) *morosa*, new species, 1; *Vemana lemuresa*, new species, 1.

Station 7358. 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

Acercoides callida, new species, 1; *A. edax*, new species, 1; *Ampelisca coa* 9; *A. macrocephala unsocalae* 8; *A. plumosa* 2; *A. pugetica mora*, new subspecies, 1; *Ampelisca* species 1; *Austrosyrrhoe rinconis*, new species, 1; *Bathymedon caino*, new species, 3; *Bonnierella palenquia*, new species, 2; *Harpiniopsis epistomata* 7;

H. fulgens 1; *H. profundis* 6; *Lepechinella arctica turpis*, new subspecies, 3; *Liljeborgia cota* 2; *Monoculodes diversiscxus*, new species, 3; *M. latissimanus* 1; *Phoxocephalus kergueleni* 7; *Pseudotiron pervicax*, new species, 1; *Syrrhoites cohasscta*, new species, 1; *S. dulcis*, new species, 25; *S. silex*, new species, 6; *S. trux*, new species, 1; *Tosilus arroyo* 1.

Station 7359. 27°32′10″ N, 115°04′45″ W, 1096 m, Apr. 21, 1961, Sigsbee trawl.

Mctopa samsiluna 1.

Station 7364. 30°14′44″ N, 116°46′45″ W, 2673–2770 m, Apr. 27, 1961.

Phoxocephalus kergueleni 1.

AHF Acc. No. 1961–15, 61A6–41A, 8.5 mi W of Islas San Benitos, Baja California, 28°20′ N, 115°45′ W, 1187 m, Sept. 11, 1961, mesopelagic trap.

(*Euonyx lacqueus*, new species, 26)

*USNM Acc. No. 247045, Santa Monica Bay, Calif., 183 m, in hagfish trap on mud bottom baited with dead fish, Feb. 18–19, 1963, coll. Dr. Theodore R. Folsom, Scripps Institution of Oceanography.

Anonyx carinatus 1; *Orchomene pinguis* 180; *Schisturella totorami*, new species, 5; *Valettiopsis dentatus* 11.

**Baja Slope Expedition, St. P 285–61, 23°59.5′ N to 24°09.2′ N, 113° 11.9′ W to 113°20.0′ W, 3479–3515 m, May 3, 1961, silty clay, temp. 2.5°C, collected by Dr. Robert H. Parker.

Amathillopsis pacifica margo, new subspecies, 1; *Mesoplcustes abyssorum* 1; *Parandanicxis mirabilis* 2.

Ampeliscidae

Ampelisca Krøyer

Ampelisca amblyopsoides J. L. Barnard

Ampelisca amblyopsoides J. L. Barnard, 1960a, pp. 24–25, fig. 4.—J. L. Barnard, 1966a, p. 52.

This species differs from *Ampelisca eoa* Gurjanova (?=*A. catalinensis* J. L. Barnard) in having a shorter second article on antenna 1. The specimen at hand has a spine on the apex of the outer ramus of uropod 2 and in this way resembles *A. eoa*. Perhaps such spines existed on the type-material of *A. amblyopsoides*, but were destroyed in the collecting process.

Material.—Station 7235 (1).

Distribution.—Southern California to middle Baja California, 1123–1481 m.

Ampelisca eoa Gurjanova

Ampelisca eoa Gurjanova, 1951, pp. 313–314, fig. 178.—J. L. Barnard, 1960a, p. 25.—J. L. Barnard, 1966a, p. 53.

?Ampelisca catalinensis J. L. Barnard, 1954, pp. 7–9, pls. 1, 2.

MATERIAL.—Stations 7228 (1), 7229 (2), 7231 (2), 7358 (9).

DISTRIBUTION.—Bering Sea to middle Baja California, 421–3718 m.

Ampelisca furcigera Bulycheva

Ampelisca furcigera Bulycheva, 1936, pp. 242–244, figs. 1–3.—Gurjanova, 1951, pp. 314–316, fig. 180.—J. L. Barnard, 1960a, pp. 26–27, fig. 6; 1966a, p. 53.

MATERIAL.—Station 7235 (1).

DISTRIBUTION.—Bering, Okhotsk, and Japan Seas, 60–205 m; southern California to middle Baja California, 212–1248 m.

Ampelisca macrocephala unsocalae J. L. Barnard

Ampelisca macrocephala unsocalae J. L. Barnard, 1960a, pp. 28–30, fig. 7; 1966a, pp. 53–54.

MATERIAL.—Stations 7229 (2), 7358 (8).

DISTRIBUTION.—Southern California to middle Baja California, 403–1720 m.

Ampelisca plumosa Holmes

Ampelisca plumosa Holmes, 1908, pp. 509–510, fig. 18.—J. L. Barnard, 1960a, pp. 30–31, fig. 8; 1966a, p. 54.

MATERIAL.—Stations 7230 (1), 7235 (1), 7358 (2).

DISTRIBUTION.—Southern California to middle Baja California, 813–2667 m.

Ampelisca pugetica mora, new subspecies

FIGURE 1 *a–c*

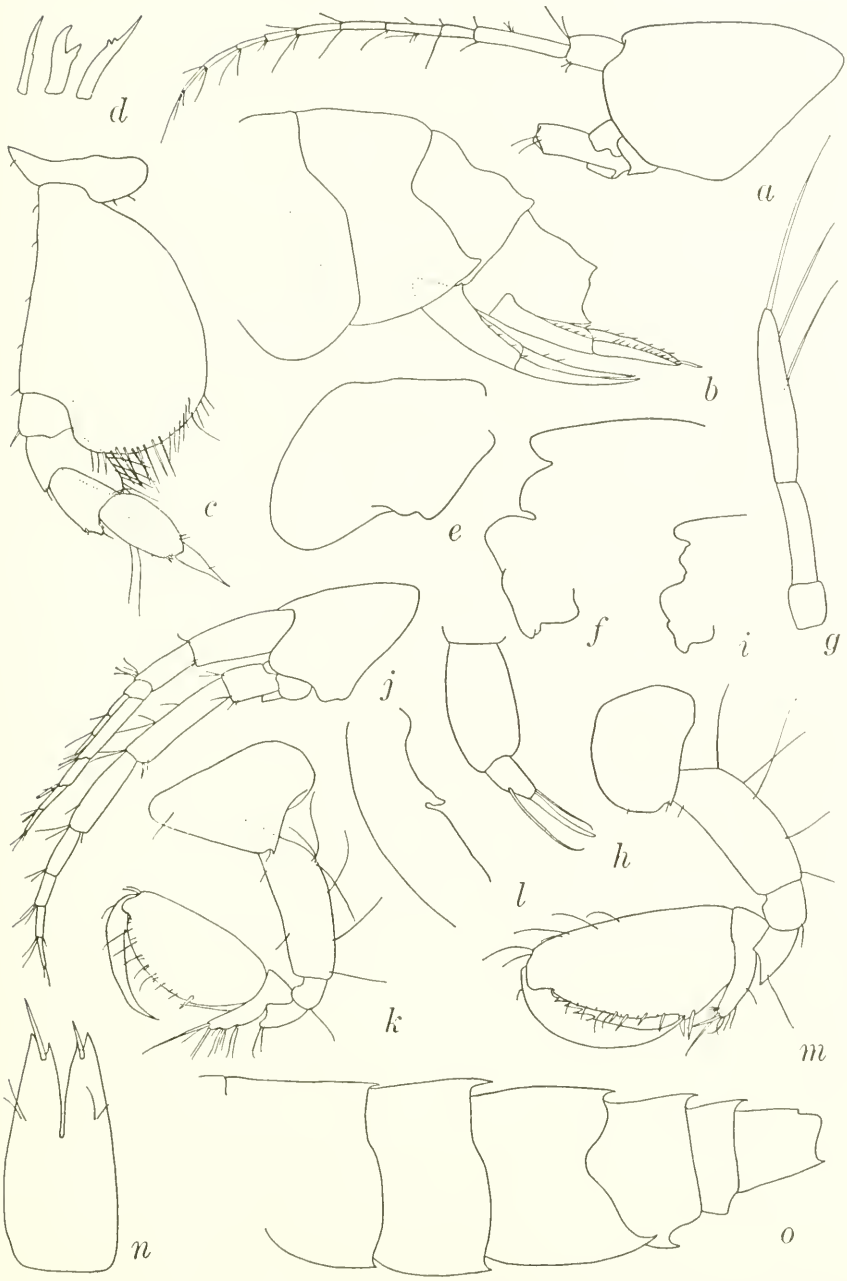
DIAGNOSIS.—Differing from the typical subspecies described by J. L. Barnard (1954) in the absence of corneal lenses, the broader anterior portion of the head having the margin ventral to the antennal corner less oblique, the slightly broader article 2 of pereopod 5, and the slightly longer uropod 1.

HOLOTYPE.—AHF No. 6026, female-like, 6.0 mm.

TYPE-LOCALITY.—Station 7235, 27°42′30″ N, 115°25′55″ W, 1248–1292 m, Jan. 2, 1960.

→

FIGURE 1.—*Ampelisca pugetica mora*, new subspecies, holotype, female, 7235: *a*, head and antenna 1; *b*, pleonites 2–6 (5, 6 fused), left to right, and uropods 1,2; *c*, pereopod 5. *Argissa ?hamatipes* (Norman), male, 4.7 mm, 7229: *d*, 3 spine-kinds on palp of maxilla 1; *e*, coxa 3; *f*, outline of midsagittal section through head, showing rostrum above, subrostral keel in the middle, and epistome-labrum projecting below, all pointing to left;



g, mandibular palp; *h*, maxillipedal palp articles 3,4, 4 with spine and two setae; *i*, comparison of midsagittal cephalic section of specimen from southern California coastal shelf to figure f (same magnification). *Liljeborgia cota* J. L. Barnard, male, 3.9 mm, 7358: *j*, head and antennae; *k*, gnathopod 1; *l*, base of dactyl of gnathopod 1; *m*, gnathopod 2; *n*, telson; *o*, pleon.

Material.—Stations 7235 (1), 7358 (1).

Remarks.—This subspecies is clearly derived from the nearby coastal shelf population and parallels other cases such as *Ampelisca macrocephala unsocalae*, *Heterophoxus oculatus* (Holmes) and various species of *Listriella* in its loss of eyes and slight modification of other characters.

Distribution.—Middle Baja California, 1205–1248 m.

Ampelisca species

Figure 2

Description.—Interantennal cephalic lobe projecting subacutely, anterior cephalic margin ventral to lobe oblique but not strongly so; corneal lenses absent; antenna 1 extending to apex of peduncle of antenna 2, article 2 of peduncle about 1.4 times as long as article 1, article 3 about one third as long as article 2, flagellum scarcely half as long as peduncle and composed of 4 long articles; antenna 2 scarcely half as long as body, flagellum slightly longer than peduncle, articles of flagellum elongated; coxa 1 with conspicuous posteroventral notch, coxae 2 and 3 with rudimentary notches; pereopods 1 and 2 very slender and poorly setose, dactyls longer than articles 5 and 6 combined; pereopods 3–5 poorly setose, fifth articles of pereopods 3 and 4 slightly produced posterodistally, lacking submarginal posterior spines; posterior lobe of article 2 on pereopod 5 extending subquadrately to distal end of article 4, distal margin bearing one or no setae, anterodistal margin of lobe bearing one or no setae (both setae are illustrated on pereopod 5 but the appendage on either side of the unique holotype bears only one or the other of the setae); article 4 of pereopod 5 slightly longer than article 3, articles 3–7 slender, decreasing in width consecutively, articles 5–7 decreasing slightly in length consecutively; third pleonal epimeron with nearly straight posterior margin, posteroventral corner produced into tooth of medium size; pleonite 4 with dorsal process nearly obsolete; uropod 1 slender, reaching distal end of uropod 2, rami equal in length, unarmed dorsally; uropod 2 slender, outer ramus shorter than inner, outer ramus with one, inner ramus with two dorsal spines; uropod 3 slender, rami subequal, lanceolate, poorly setose; telson asymmetrical (possibly scarred), one apex with acute medial cusp, other apex broadly subacute, each apex with two short setae.

Material.—Station 7358, ?male, 2.4 mm.

Relationship.—This specimen closely resembles *Ampelisca amblyopsoides* J. L. Barnard (1960a) and may be its ecotype or its juvenile. Adults of *A. amblyopsoides* reach 9 mm in length. The distinguishing characters of the unique specimen, such as the sparse setae and

small number of flagellar articles, are largely those of a juvenile. Other differences are the slightly longer first antennae, the slightly larger tooth of the third pleonal epimeron, the presence of coxal notches and the slightly different shape of the posterior lobe on pereopod 5.

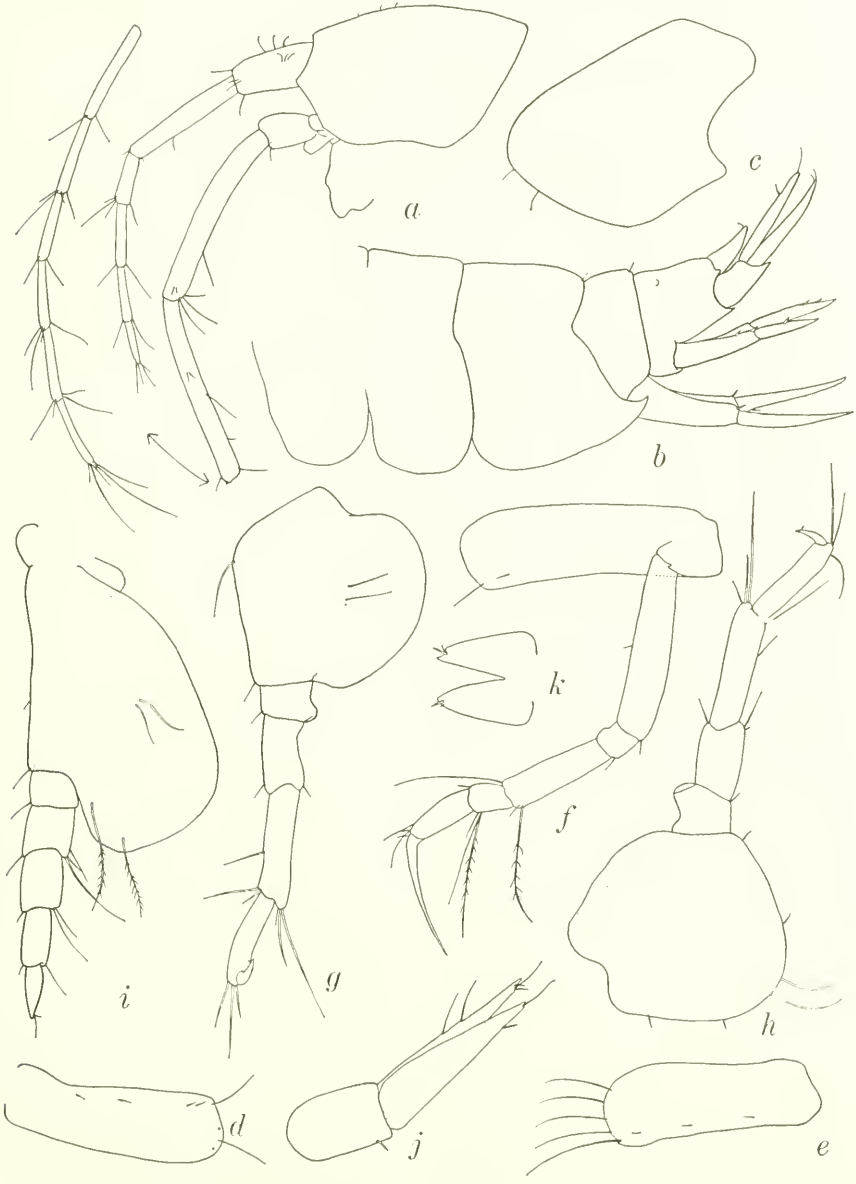


FIGURE 2.—*Ampelisca* species, ?male, 2.9 mm, 7358: *a*, head with offset flagellum of antenna 2; *b*, pleon; *c–e*, coxae 4,2,1; *f–i*, pereopods 1,3,4,5; *j*, uropod 3; *k*, telson.

Byblis Boeck

Byblis teres, new species

FIGURE 3

DIAGNOSIS.—Corneal lenses absent; anteroventral cephalic corner pointed, ventral cephalic margin oblique; accessory process of gland-cone rounded distally, not sharply acute as in other species of the

FIGURE 3.—*Byblis teres*, new species, holotype, ?sex, 4.8 mm, 7234: *a*, *b*, head; *c*, pleonal epimeron 3, left; *d*,*e*, coxae 2,4; *f*, telson; *g*–*i*, uropods 1,2,3; *j*–*m* pereopods 1,3,4,5 *n*, gnathopod 1.

genus; antenna 1 slightly exceeding peduncle of antenna 2, article 2 about 2.5 times as long as article 1 and about 75 percent as long as article 4 of antenna 2; antenna 2 much shorter than body length; pereopods 3 and 4 having article 5 slightly produced posterodistally; pereopod 2 not of elongated kind as in *B. lepta* (Giles); article 6 of pereopod 5 slightly longer than article 5, article 7 (including distal seta) as long as article 6; inner ramus of uropod 3 with two spines, outer with one, apposing margins of rami not serrate, but microscopically pectinate; telson cleft halfway.

Holotype.—AHF No. 6122, ?young male, 4.8 mm.

Type-locality.—Station 7234, 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

Material.—Two specimens from the type-locality.

Relationship.—This species resembles *Byblis crassicornis* Metzger (in Sars, 1895, pl. 66, fig. 1) but the first antennae of *B. teres* are shorter and the outer ramus of uropod 3 lacks the single large serration. The most closely related species in the northeastern Pacific Ocean is *B. tannerensis* J. L. Barnard (1966a) but it differs from *B. teres* by the serrate rami of uropod 3 and the acute, not rounded process of the gland-cone.

Aoridae

Lembos Bate

Lembos edentulus, new species

Figure 4

Diagnosis.—Body very slender, coxae unusually small, posterior coxae not touching each other; rostrum and lateral cephalic lobe scarcely projecting, blunt; eyes absent; mandibular palp article 3 subequal to article 2 in length, not falciform, bearing long terminal setae and row of terminal and subterminal short setae; inner plate of maxilla 1 vestigial, bearing one very long seta; mouthparts, including upper and lower lips, like those of *Lembos websteri* (Bate) (see Sars, 1895, pl. 194), except for mandible and maxilla 1 figured herein; coxa 1 hemi-oval; gnathopod 1 scarcely enlarged, poorly developed for male *Lembos*, palm well defined, slightly oblique, shorter than posterior margin of article 6, dactyl exceeding palm in length; gnathopod 2 slender, palm very short, dactyl slightly exceeding palm; article 6 of pereopod 1 (? and 2) unusually slender; article 2 of pereopod 3 unexpanded, article 5 having 3 large distal spines; pereopods 2, 4, 5 missing from unique specimen; pleonal epimera 1–3 rounded posteroventrally; uropods 1 and 2 each with long, acute distoventral process on

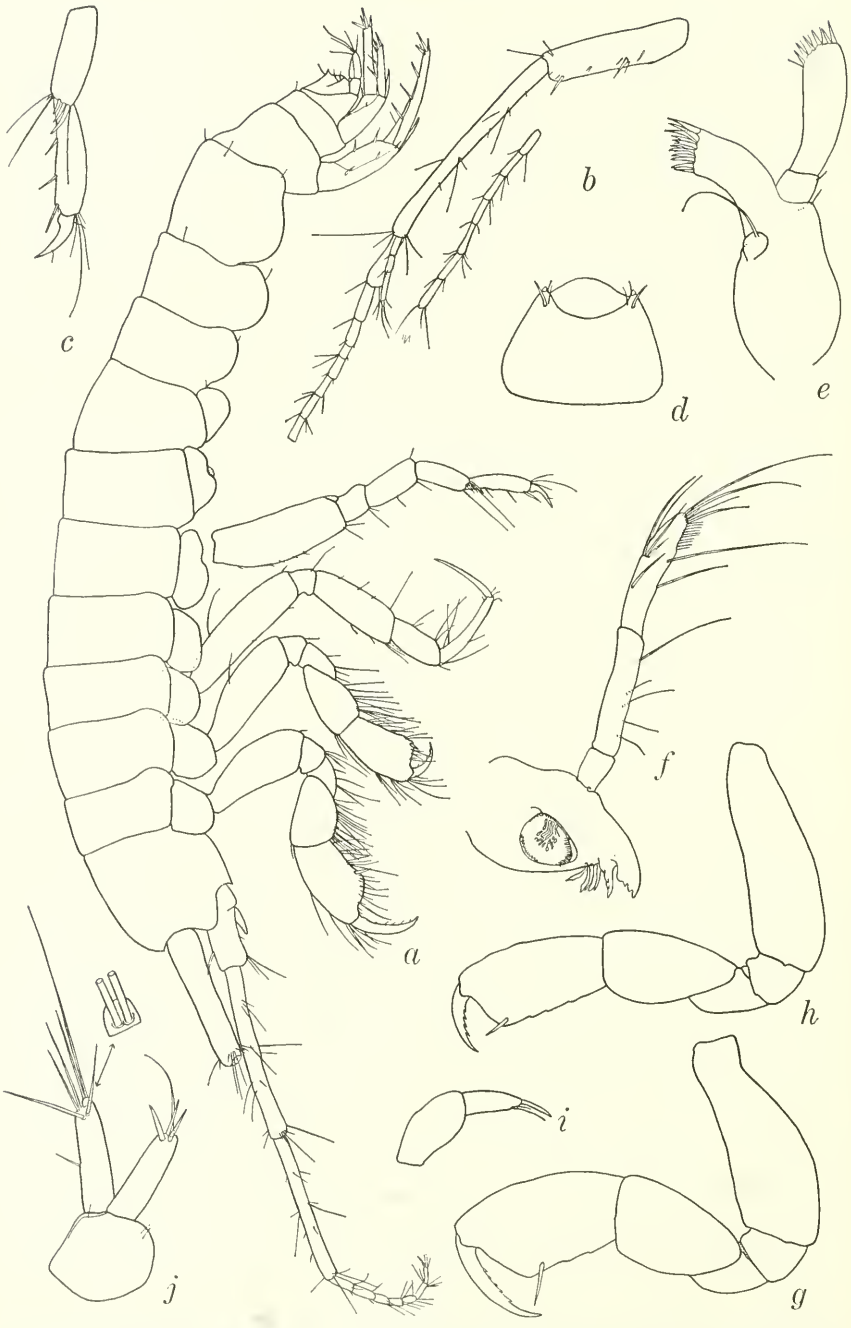


FIGURE 4.—*Lembos edentulus*, new species, holotype, male, 6.0 mm, 7234: *a*, lateral aspect; *b*, antenna 1 with offset flagellar portion and remainder missing; *c*, articles 5–7 of pereopod 3; *d*, telson; *e*, maxilla 1; *f*, mandible *g,h*, gnathopods 1,2, minus setae; *i*, maxillipedal palp articles 3,4; *j*, uropod 3.

peduncle; peduncle of uropod 3 short, flat, rami longer than peduncle, outer slightly longer than inner and bearing minute, barrel-shaped article furnished with two long setae attached near base of article 2; telson short, broad, with cornified lateral lobes, each armed with three setae, posteroventral margin of telson rounded, posterodistal margin slightly excavate.

Holotype.—AHF No. 6129, male, 6.0 mm. Unique.

Type-locality.—Station 7234, 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

Relationship.—This species differs from its close relative, *Lembos longidigitans* (Bonnier, 1896), from the bathyal of the northeastern Atlantic Ocean, by having a more slender mandibular palp article 3, which is not falciform and has a distinct setal arrangement, by the longer mandibular palp article 2, the blunt, hemi-oval coxa 1, the slender article 2 of pereopod 3, the more slender article 6 of pereopod 1 (? and 2) and possibly by the slight differences in pleonal epimera 1 and 2. The lateral cephalic lobe of *L. edentulus* apparently is better developed than that of *L. longidigitans*.

Lembos lobata J. L. Barnard (1962a), the only other deep-sea species of *Lembos* (abyssal of southeast Atlantic Ocean), has a narrower cephalic lobe than does *L. edentulus*, a longer mandibular palp article 3 and a smaller distoventral process of the peduncle of uropod 2.

The three deep-sea species of *Lembos* differ from 27 known shallow-water species by the reduced inner plate of maxilla 1, the small coxae, the absence of eyes and the short, broadly expanded peduncle of uropod 3. Male gnathopod 1 of shallow-water species usually is well developed and ornamented differently in the several species, but the three deep-sea species have a poorly developed first gnathopod: that of *L. lobata* is very youthful in appearance; that of *L. edentulus* is of intermediate modification; and only that of *L. longidigitans* has an ornamented palm; however, gnathopod 1 of the latter species is not greatly enlarged. In contrast to other species of the genus, *L. edentulus* has a minute second article on the outer ramus of uropod 3. The three deep-sea species may constitute a new genus.

Lembos lobata and *L. edentulus* are remarkable species of *Lembos* in which the article 2 of pereopod 3 is unexpanded, but *L. longidigitans*, otherwise similar to the above taxa, has an expanded second article.

Argissidae

Argissa Boeck

Argissa ?hamatipes (Norman)

FIGURE 1 *d–i*

Syrrhoë hamatipes Norman, 1869, p. 279.
Argissa typica Boeck.—Sars, 1895, pp. 141–142, pl. 48 (with synonymy).
?Argissa Stebbingi Bonnier, 1896, pp. 626–630, pl. 36, fig. 4.
Argissa hamatipes (Norman).—Stebbing, 1906, p. 277 (with synonymy).—Shoemaker, 1930, pp. 37–40, figs. 15, 16.—Stephensen, 1935, p. 140.—Gurjanova, 1951, pp. 327–328, fig. 193.—J. L. Barnard, 1962c, p. 151; 1966a, p. 61.

A single male, 4.7 mm long, resembles the figures of *Argissa hamatipes* published by Sars (1895) in the following characters: general aspect, antennae, pleonal epimera, uropods, all coxae but the third, gnathopods, all portions of the pereopods except article 4 of pereopods 3 and 4, mandibular body, maxilla 2, all portions of the maxilliped but palp article 4, telson and lower lip. The specimen at hand differs from Sars' figures in having only one seta on the inner plate of maxilla 1, a longer and more slender mandibular palp, a rounded, not subacute coxa 3, no eyes, no posterior setae on article 4 of pereopods 3 and 4, a broader first maxillary palp with two subserrate, three bifid and one serrate spines distally (see figures herein), and a maxillipedal palp article 4 having a distal spine scarcely longer than the article. Coxa 3, maxillipedal palp article 4 and the first maxillary palp all resemble those of *Argissa stebbingi* and the mandibular palps are intermediate in length between those of *A. hamatipes* and *A. stebbingi*. The male at hand is not as fully mature as are those males shown by Sars and Bonnier, the urosomal teeth being short, the third uropod being poorly setose and the basal flagellar articles of antenna 1 being poorly armed.

The lobulated anterior cephalic crest and epistome of *A. hamatipes* were not illustrated by Sars and no comparison can be made with those of the specimen at hand. But the anterior crest resembles that of *A. stebbingi* except for the rounded, not subacute epistome. Another specimen of *A. hamatipes*, 2.6 mm long, from the coastal shelf of southern California, has a similar anterior crest but it is weakly developed in comparison to that of the deep-water specimen and *A. stebbingi*. Whether it resembles that of Atlantic shallow-water *A. hamatipes* is unknown. Shallow-water populations of *A. hamatipes* from California also lack posterior setae on article 4 of pereopods 3 and 4, resembling the deep-water specimen.

If the following suppositions prove to be correct then *A. stebbingi* and *A. hamatipes* should be merged: (1) Probably the very thin man-

dibular palp of *A. stebbingi* is characteristic of all male argissids, as the subterminal male at hand has a palp which is intermediate between that of *A. hamatipes* (? female) and that of *A. stebbingi*. (2) The anterior cephalic crest becomes larger with increased age or with an increase in body size. (3) The long second article of the accessory flagellum of male *A. stebbingi* also is a result of terminal differentiation. (4) Coxa 3 may vary infraspecifically. (5) The absence of eyes is of no specific value.

Material.—Station 7229, male, 4.7 mm.

Distribution.—Subarctic to warm temperate in the northern hemisphere, 4–1096 m; material at hand from minimum depth of 1720 m; *A. stebbingi* recorded from northeastern Atlantic Ocean in a depth of about 940 m.

Eusiridae

Rhachotropis Smith

Rhachotropis ?cervus J. L. Barnard

? Rhachotropis cervus J. L. Barnard, 1957a, pp. 16–17, pl. 3

These specimens have the aspect of *Rhachotropis cervus* but lack the poorly developed carinal tooth of pleonite 4, and thus they resemble *R. elegans* Bonnier (1896), a species that has been considered to be a synonym of *R. grimaldii* Chevreux (1900). Chevreux' figure of *R. grimaldii* shows a dorsal carina terminating obtusely on the posterior half of pleonite 4. Bonnier's figure shows little evidence of the carina. Both *R. elegans* and *R. grimaldii* differ from *R. cervus* and the material at hand, however, in the absence of a posterolateral tooth on pereonite 7 dorsal to coxa 7. *Rhachotropis cervus* also has a fourth coxa that is broader than the third and is slightly extended and produced posteriorly. *Rhachotropis grimaldii* has a symmetrical fourth coxa, which is no broader than coxa 3. *Rhachotropis elegans* has a fourth coxa similar to that of *R. cervus* but it is scarcely broader than coxa 3. All coxae of *R. cervus* are larger than those described for *R. elegans*, and the material at hand is intermediate between *R. cervus* and *R. elegans* in the size of all coxae and the width of coxa 4. The lateral cephalic lobes are not clear in either *R. grimaldii* or *R. elegans*. Various other small differences are noticeable among the three species in the second articles of pereopods 3 and 5, coxa 1, the posterolateral margin of pleonite 4 above the insertion of uropod 1, and the accessory flagellum. All are characters that should be studied when reexamination of *R. grimaldii* and *R. elegans* can be made.

The specimens at hand have the small process above the insertion of uropod 1 very slightly larger than shown by Barnard for *R. cervus*, but not as large as shown for *R. grimaldii* by Chevreux.

Material.—Station 7234 (2).

Distribution.—The type-material was collected off southern California in a depth of approximately 1000 m.

Rhachotropis clemens, new species

Figure 5

Diagnosis.—Eyes absent; rostrum extending slightly more than halfway along article 1 of antenna 1, slightly downturned; lateral cephalic lobes asymmetrically acute; distal end of article 1 of antenna 1 with three sharp cusps, remainder of antenna missing; coxae well developed in comparison to *R. anoculata* J. L. Barnard (1962a), coxa 1 strongly produced anteriorwards, blunt apically, coxae 2–4 not accuminate; article 2 of gnathopod 1 having medial row of stout spines; lobes of fifth articles of gnathopods interequal in size; second articles of pereopods 3 and 4 slender, posterior margins sharply serrate; article 2 of pereopod 5 oval, posteriorly armed wth large but sparsely occurring serrations; pereonite 7 lacking dorsal tooth but ventrolaterally produced posteriorwards; pleonites 1 and 2 each with one posterodorsal tooth and one posterolateral tooth on each side, carinae poorly developed, pleonite 3 lacking dorsal sculpture, pleonite 4 bearing one large, nearly oblique dorsal tooth and one sharp cusp dorsal to insertion of uropod 1; pleonal epimeron 1 with several large posterior serrations, epimeron 2 with sinuous, minutely serrate posterior margin, epimeron 3 strongly serrate ventrally and posteriorly; telson cleft about one-twelfth of its length.

Holotype.—AHF No. 6121, female, 4.5 mm.

Type-locality.—Station 7234, 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

Material.—Three specimens from the type-locality.

Relationship.—This species bears a close resemblance to *Rhachotropis rostrata* Bonnier (1896) but differs by the presence of a lateral tooth on each side of pleonite 1, the larger coxae and the smaller cleft of the telson.

Although *R. clemens* has affinities with *R. antarctica* K. H. Barnard (see key in J. L. Barnard, 1957a) it differs by the absence of carinae either on pleonite 3 or lateral carinae on pleonite 4.

Rhachotropis anomala K. H. Barnard (1916) differs from *R. clemens* by the absence of lateral teeth on pleonites 1 and 2 and the absence of a dorsal tooth on pleonite 1.

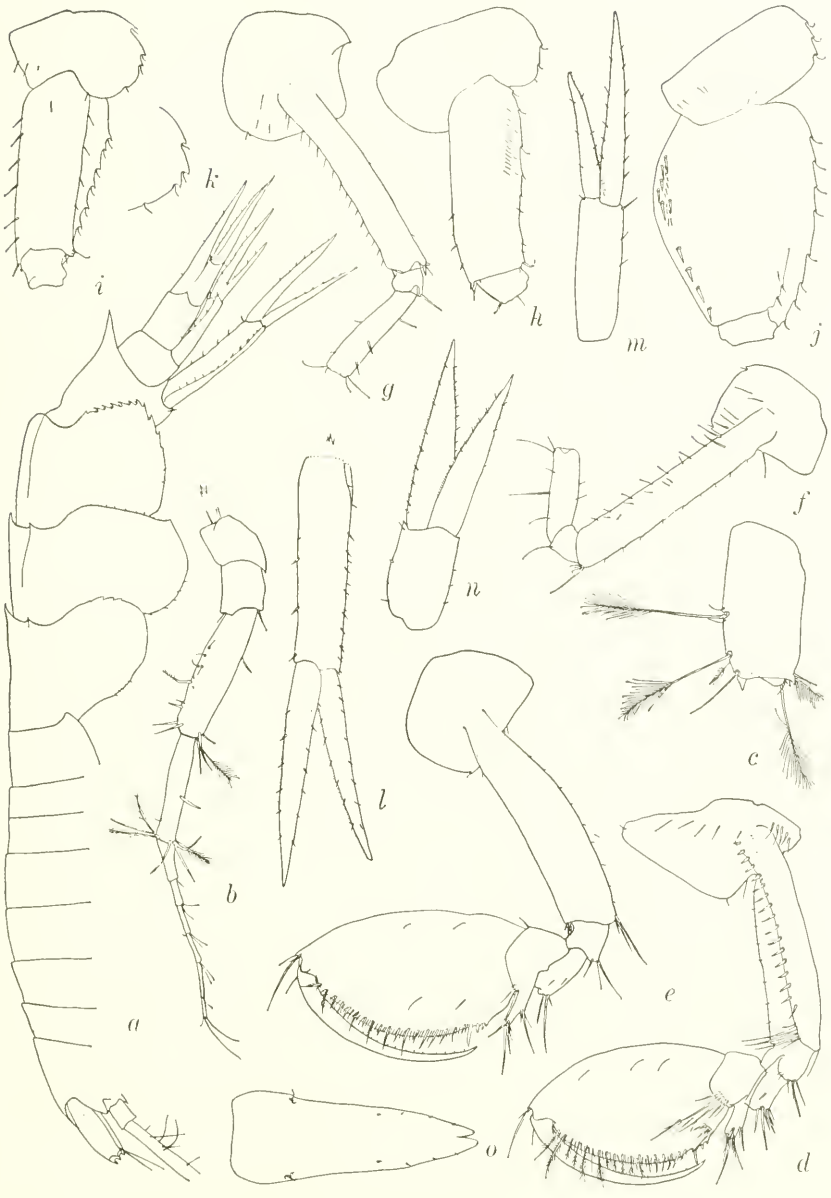


FIGURE 5.—*Rhachotropis clemens*, new species, holotype, female, 4.5 mm, 7234: *a*, lateral view of dorsal portion of body; *b*, antenna 2, twisted at base; *c*, article 1 of antenna 1; *d,e*, gnathopods 1,2; *f–j*, pereopods, 1,2,3,4,5, all with missing parts; *k*, coxa 4 of side other than that of fig. *i*; *l–n*, uropods 1,2,3; *o*, telson.

The tooth of pleonite 4 is more oblique in the other specimens of this species than it is in the holotype.

Rhachotropis ludificor, new species

FIGURE 6

DIAGNOSIS.—Eyes absent; rostrum long, broad, somewhat linguiform, apically obtuse, separated from anterior cephalic keel by deep, slender incision, rostrum slightly downturned; lateral cephalic lobes scarcely falciform, ventral margins straight, each lobe separated from ventral cephalic region by small notch, lobe nearly pointed; article 1 of antenna 1 with two small distal cusps anteriorly and ventrally, accessory flagellum vestigial, represented by small protuberance with three setae; mouthparts like those of *R. helleri* (Boeck) (in Sars, 1895, pl. 150) ; coxa 1 strongly extended forward, blunt apically, coxae 2–4 not acuminate; gnathopods very stout, similar to each other, article 5 lobe of gnathopod 2 more slender than that of gnathopod 1, article 2 of gnathopod 1 with medial row of stout spines; second articles of pereopods 3 and 4 slightly expanded and subovate, article 2 of pereopod 5 with long, broad, posteroventral lobe, posterior margin evenly and sparsely serrate; pereonite 7 lacking dorsal tooth, posteroventral corner extended and subacute; pleonites 1–4 each with one posterodorsal tooth, decreasing in size posteriorly, that of pleonite 1 long and slender, that of pleonite 4 nearly obsolete, no pleonite with lateral ridges or teeth, pleonite 4 with small, broad, acute process above insertion of uropod 1; pleonal epimera 1–3 rounded at posteroventral corners, epimera 1 and 2 smooth, 3 with large serrations at posteroventral corner; telson cleft about one third of its length.

HOLOTYPE.—AHF No. 6037, male, 4.5 mm. Unique.

TYPE-LOCALITY.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

RELATIONSHIP. — This species resembles *Rhachotropis distincta* (Holmes, 1908, see Shoemaker, 1930) and *R. gracilis* Bonnier (1896) but differs from those species by the deeper cleft of the telson, the smaller dorsal teeth of pleonites 2–4 and the absence of serrations on pleonal epimeron 3. *Rhachotropis portoricana* J. L. Barnard (1964b) has no teeth on pleonite 4 and a short-clefted telson. *Rhachotropis faeroensis* Stephensen (1944) has a short-clefted telson, a larger dorsal tooth on pleonite 4, a smaller tooth on pleonite 1, and a longer, more evenly tapering rostrum than those of *R. ludificor*. *Rhachotropis anomala* K. H. Barnard (1916) differs from the new species in the absence of teeth on pleonites 1 and 3 and the absence of serrations on the third pleonal epimeron. *Rhachotropis proxima* Chevreux (1911) has a very long, downturned, acutely tapering rostrum and shorter cleft on the telson than does *R. ludificor*.

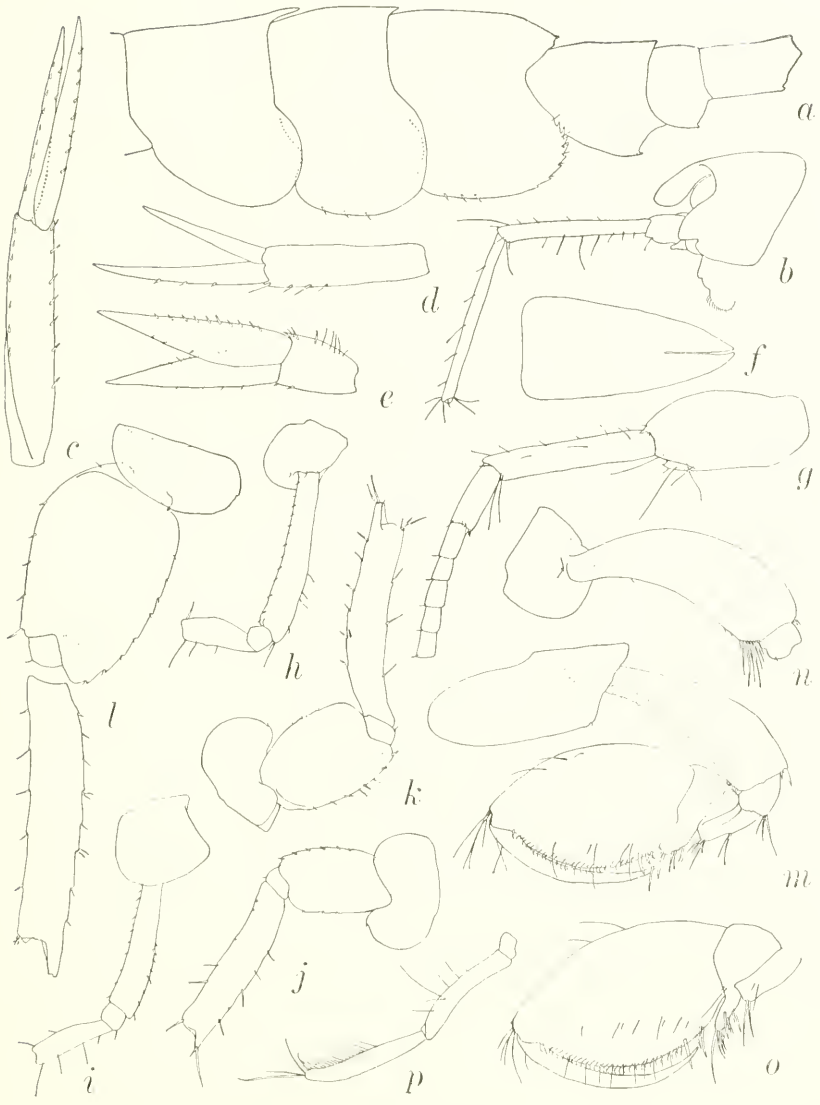


FIGURE 6.—*Rhachotropis ludificor*, new species, holotype, male, 4.5 mm, 7229: *a*, pleon; *b*, head; *c–e*, uropods 1,2,3; *f*, telson; *g*, antenna 1, medial; *h–l*, pereopods 1,2,3,4,5, with parts missing; *m*, gnathopod 1; *n,o*, gnathopod 2 in two pieces; *p*, mandibular palp.

Rhachotropis multesimus, new species

FIGURE 7

DIAGNOSIS.—Eyes absent; rostrum very short, blunt, with minute distal cusp, rostrum separated from anteriorly produced and rounded cephalic keel by deep notch; lateral cephalic lobes strongly defined,

anteriorly truncated; distal margins of article 1 of antenna 1 with three cusps, of article 2 with two cusps, accessory flagellum minute, barrel shaped, uniarticulate; mouthparts similar to those of *Rhachotropis cervus* J. L. Barnard (1957a) but mandibular palp article 3 shorter than article 2 and setose only apically, inner lobe of maxilla 2 slightly more slender; coxa 1 broadly and bluntly extended anteriorly,

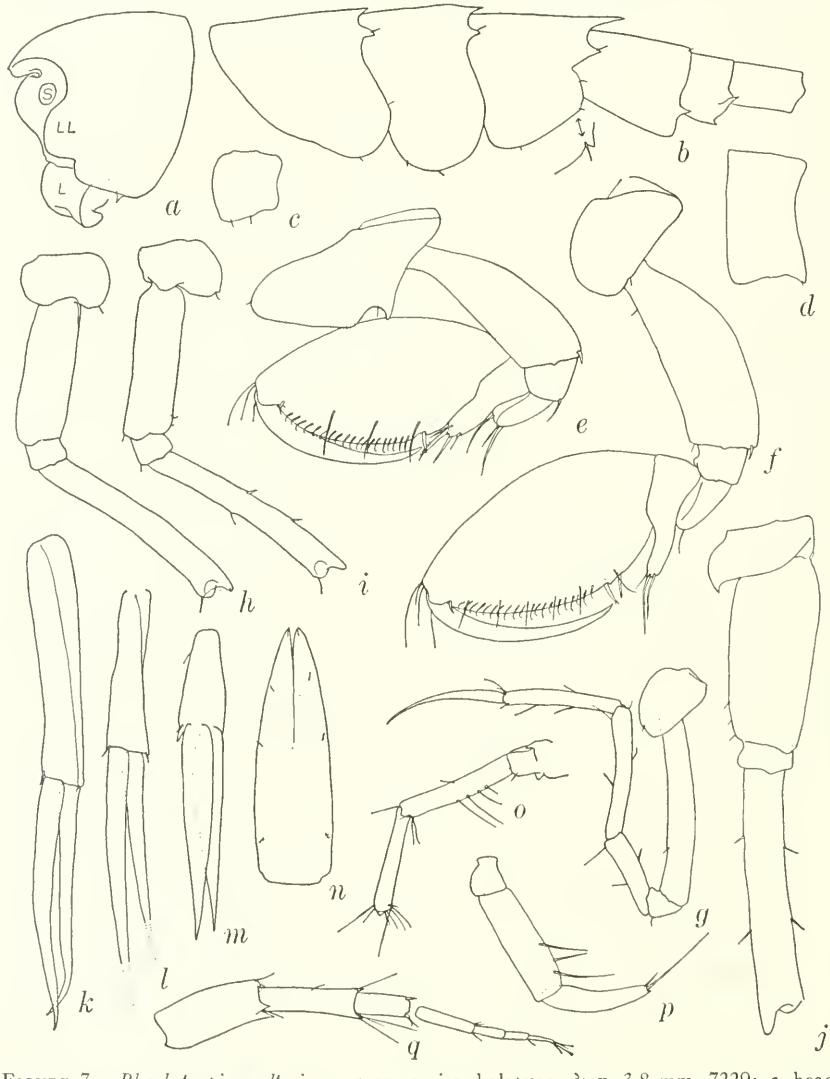


FIGURE 7.—*Rhachotropis multesimus*, new species, holotype, ♀sex, 3.8 mm, 7229: *a*, head, left side (LL=lateral lobe, L=labrum, S=attachment of antenna 1); *b*, pleon; *c*, coxa 4; *d*, pereonite 7, left side: *e,f*, gnathopods 1,2; *g–i*, pereopods 1,3,4, left; *j*, pereopod 5; right; *k–m*, uropods 1,2,3 (dotted areas reconstructed); *n*, telson; *o*, peduncle of left antenna 2; *p*, mandibular palp; *q*, antenna 1, left medial.

posterior portion of ventral margin with deep excavation defined by sharp cusp; coxae 2 and 3 not acuminate, coxa 4 nearly as long as wide, scarcely excavate posteriorly, posteroventral corner rounded, coxa 7 with posteroventral hooklike cusp; article 2 of gnathopod 1 lacking medial spine row, lobe of article 5 on gnathopod 2 more slender than on gnathopod 1; second articles of pereopods 3 and 4 linear, of pereopod 5 very slender for the genus, posterodistal corner simple, rounded; pereonite 7 lacking dorsal tooth, posterolateral corner slightly produced ventrally; pleonites 1–3 tricuspidate, lateral teeth lacking carinae, pleonites 4 and 5 dorsally simple, posterolaterally with small processes above insertions of uropods; pleonal epimera 1 and 2 posteroventrally rounded, epimeron 3 with ventroposterior portion convex, posteroventral corner with small tooth and notch, otherwise unserrated; telson cleft nearly halfway.

Holotype.—AHF No. 6031, ?sex, 3.8 mm. Unique.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Relationship.—This species has affinities with *Rhachotropis grimaldii* (see Chevreux, 1900), from the north Atlantic Ocean, because of a dorsally tricuspidate pleonite 3, the absence of a dorsal tooth from pleonite 4, the absence of a dorsal tooth from pereonite 7 and the deeply cleft telson. *Rhachotropis elegans* Bonnier (1896) has been considered to be a synonym of *R. grimaldii* and the species at hand resembles the figures of *R. elegans* in its lack of a dorsal crest on pleonite 4, which is shown to occur on *R. grimaldii* by Chevreux (1900). *Rhachotropis multesimus* differs from *R. grimaldii* and *R. elegans* by the absence of serrations on pleonal epimeron 3, by the deeply excavate and posteriorly hooked ventral margin of coxa 1, and by the slender second article of pereopod 5. The new species resembles *R. cervus* J. L. Barnard (1957a), from bathyal southern California, but the latter has a distinct, although small, tooth on pleonite 4, a broadly expanded article 2 of pereopod 5, an elongated mandibular palp article 3, an acute rostrum, a poorly excavate coxa 1 and other minor differences. The Arctic-North Atlantic *Rhachotropis oculatus* (Hansen) has eyes, serrate third pleonal epimeron, a minute dorsal tooth on pereonite 7 and unexcavate coxa 1.

Haustoriidae

Urothoides Stebbing

Urothoides Stebbing, 1891, p. 26.

Diagnosis (revised).—Rostrum well developed, broad, flat, turned downwards and tucked between antennae; body short, setose, legs

extremely broad in relation to body; coxae 1–4 enlarged, similar in size to each other, subquadrate; mandibles enormous,* *lacinia mobilis* of one side very large,* of other side small,* molar large,* weakly triturative, nearly smooth, palp 3-articulate, borne directly on mandibular body, article 3 slender; lower lip with enlarged inner lobes* nearly obscuring tips of outer lobes, mandibular processes well developed and blunt; palp of maxilla 1 biarticulate; article 2 of maxillipedal palp much wider than base of article 3, latter article slightly produced apically, article 4 long, finger-like, bearing two long apical setae; antenna 1 not geniculate, antenna 2 with only two flagellar articles; gnathopods similar to each other, small, subchelate, fifth articles longer than sixth and slightly lobate posteriorly; pereopods bearing seventh articles, pereopods 1 and 2 similar to each other; pereopod 3 with expanded second article* and pereopod 4 with slightly to strongly expanded articles 4 and 5; pereopod 5 slightly shorter and of somewhat different structure than pereopod 4; article 5 very broadly lamelliform and forming ventrally extended lobe; inner ramus of uropod 3 scale-like, or spiniform, less than half as long as outer ramus; telson deeply cleft.

Remarks.—The following new species of *Urothoides* so strikingly conforms to the type-species *Urothoe lachneessa* Stebbing (1888) and so little to the only other described species of *Urothoides* that the diagnosis of *Urothoides* is slightly emended and *Urothoides oniscoides* K. H. Barnard (1932) is removed to *Urothoe* Dana provisionally. Thus, *Urothoides* differs from *Urothoe* especially in the enlarged rostrum and the phoxocephalid-like pereopod 5, with ventrally extended lamelliform article 2.

By definition this genus belongs with the Phoxocephalidae but it is assigned to the Haustoriidae because it has many characters of that family, bears close relationship to *Carangolia* J. L. Barnard (1961) and differs in its external appearance from any other phoxocephalid. Indeed, it is a short, squat-bodied genus, having considerable setation of the body segments, whereas phoxocephalids (except some species of *Paraphoxus*) have slender bodies and a slick and shiny chitin usually devoid of dorsal setae. The presence of a well-developed rostrum and the differences in proportions and structure of pereopods 4 and 5 are characters of phoxocephalids. Such genera as *Zobracho* J. L. Barnard (1961) and *Urothoides* demonstrate the difficulty of distinguishing Phoxocephalidae and Haustoriidae; further evidence of this difficulty is the fact that several genera have been assigned alternatively to either family. The enormous mandibles and their molars and the shape of article 2 of the maxillipedal palp also are characters not generally attributed to phoxocephalids. The rostrum of most

*See figures 8–10.

phoxocephalids is visor-like and arched from side to side, but *Urothoides* has a very broad and flat rostrum with an upturned peripheral flange (at least in the new species to be described). Without the rostrum the genus would have the general appearance of a *Urothoe* or a *Carangolia*, two undisputed haustoriid genera; however, the gnathopods resemble those of phoxocephalids more than they do of haustoriids.

In the Haustoriidae *Urothoides* is closest to *Carangolia*, differing from it by the occurrence of the rostrum, the long, deeply cleft telson, the shapes of pereopods 4 and 5 and the strongly subchelate gnathopods. It also resembles *Zobracho*, a genus having a rostrum, but *Urothoides* differs by the fifth pereopod being phoxocephalid in structure, by the enormous mandibular molars, and the biarticulate first maxillary palp.

In the Phoxocephalidae, *Urothoides* is closest to *Microphoxus* J. L. Barnard (1960b) but *Urothoides* differs by the occurrence of an enlarged mandibular molar, the elongated first mandibular palp article, the larger plates of the maxillipeds, the shape of maxillipedal palp article 2 and the smaller difference between pereopods 4 and 5 than that found in *Microphoxus*.

Urothoides inops, new species

FIGURES 8–10

DIAGNOSIS.—Gnathopods 1 and 2 essentially identical, thus article 5 of gnathopod 2 with posterodistal protuberance similar to that of gnathopod 1; posteroventral corners of coxae 2 and 4 sharply quadrate; article 6 of pereopod 3 distinctly longer than article 5; article 2 of pereopod 4 extremely expanded, about 2.75 times as broad as article 4, posteroventral lobe extending at least one third along article 4; when stenopodous portion of pereopod 5 folded along lobe of article 2 that lobe extending to apex of article 6, thus stenopodous portion relatively short; inner ramus of uropod 3 plate- or scale-like, article 2 of outer ramus very thin; pleonal epimeron 3 forming an extended quadrate plate.

REMARKS.—Antennae carried in peculiar positions relative to each other, first pair attached well under midpart of rostrum and thus projecting ventrally, second pair attached laterally at margin of rostrum and thus projecting laterally and dorsally; eyes absent; uropod 1 with one spine on inner ramus, uropod 2 lacking ramal spines.

HOLOTYPE.—AHF No. 6027, female, 2.8 mm.

TYPE-LOCALITY.—Station 7230, 27°52′25″ N, 115°44′30″ W, 2667–2706 m, Dec. 31, 1960.

MATERIAL.—Three specimens from the type-locality.

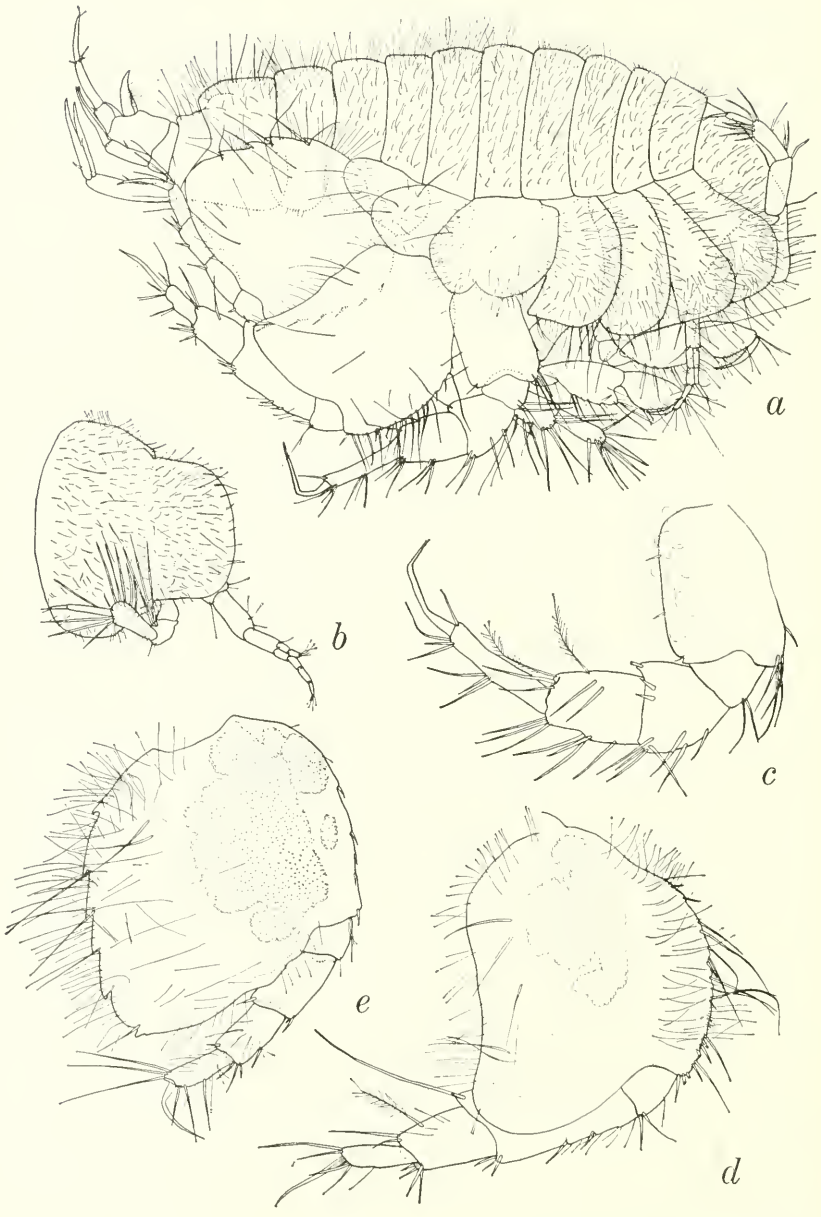


FIGURE 8.—*Urothoides inops*, new species, holotype, female, 2.8 mm, 7230: *a*, right lateral aspect; *b*, dorsal aspect of head, anterior end to right, with left antennae 1–2 removed; *c–e*, pereopods 3,4,5, right aspects, coxae removed.

Relationship.—The diagnosis distinguishes *U. inops* specifically from *U. lachneessa*. The latter has nonidentical gnathopods, gnathopod 2 having a slender article 6 with short nearly transverse palm and no posterodistal lobe on article 5. The coxae are all rounded postero-

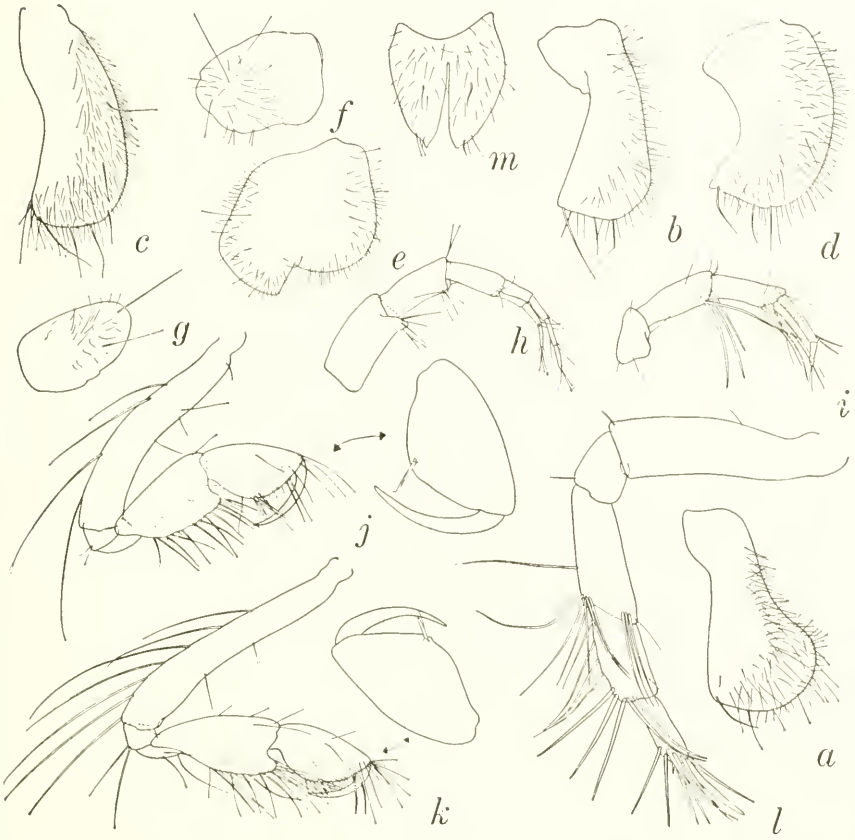


Figure 9.—*Urothoides inops*, new species, holotype, female, 2.8 mm, 7230: *a–f*, coxae 1,2,3,4,5,6, right aspects; *g*, coxa 7, left aspect; *h,i*, antennae 1,2; *j,k*, gnathopods 1,2; *l*, pereopod 1; *m*, telson.

ventrally. Article 6 of pereopod 3 is subequal to article 5, article 2 of pereopod 4 is narrower and less extended ventrally than in *U. inops*. Article 2 of pereopod 5 seems to be narrower and the stenopodous portion shorter than in *U. inops*. Pleonal epimeron 3 is rounded posteroventrally.

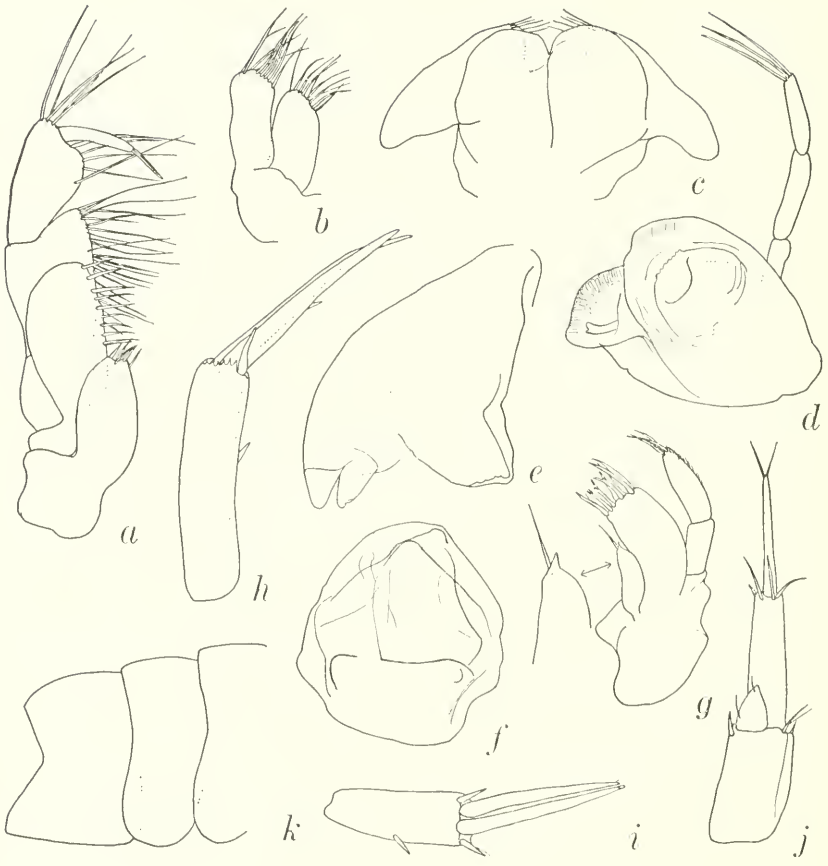


FIGURE 10.—*Urothoides inops*, new species, holotype, female, 2.8 mm, 7230: *a*, maxilliped; *b*, maxilla 2; *c*, lower lip; *d,e*, mandibles; *f*, labrum, anterior aspect; *g*, maxilla 1; *h–j*, uropods 1,2,3; *k*, pleonites 1–3, right to left.

Isaeidae

Photis Krøyer

Cedrophotis, new subgenus

DIAGNOSIS.—*Photis* with inner ramus of uropod 3 half as long as outer ramus, outer ramus uniarticulate; upper lip with deep incision; inner lobes of lower lip partially fused.

TYPE-SPECIES.—*Photis* (*Cedrophotis*) *malinalco*, new species.

***Photis (Cedrophotis) malinalco*, new species**

FIGURES 11, 12

DIAGNOSIS.—With the characters of the subgenus.

DESCRIPTION.—Eyes absent (figure of head showing brain and not an eye); lateral cephalic lobe subacute, gland-cone of antenna 2 blunt; first antennal peduncle slightly longer than flagellum, article 2 longer than 1 or 3, accessory flagellum a small, rounded scale; antenna 2 shorter than antenna 1; mouthparts generally typical of *Photis* as represented by *P. reinhardi* in Sars (1895, pl. 202) except for subgeneric distinctions noted in upper and lower lips; inner lobe of maxilla

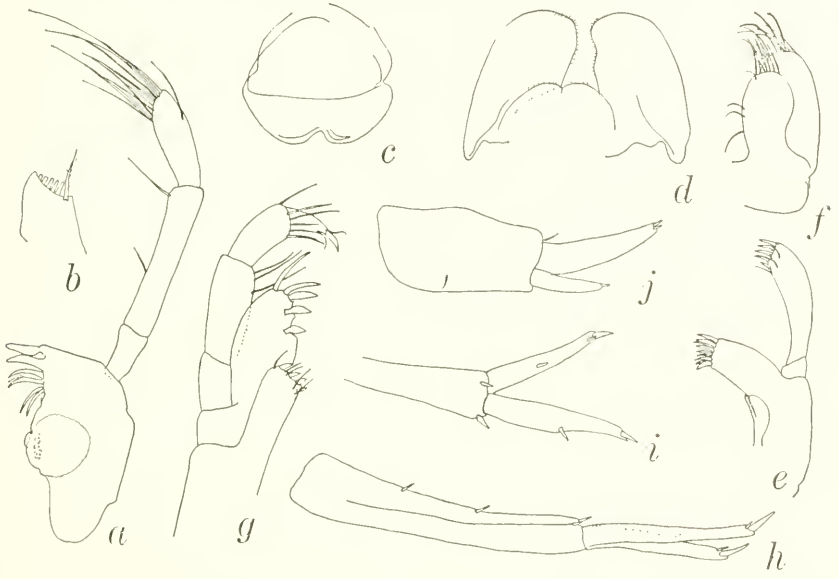


FIGURE 11.—*Photis* (*Cedrophotis*) *malinalco*, new species, holotype, juvenile, 2.2 mm, 7231: *a*, left mandible, outer surface, with molar on far side; *b*, right mandibular molar; *c*, labrum; *d*, lower lip; *e,f*, maxillae 1,2; *g*, maxilliped; *h–j*, uropods, 1,2,3.

2 poorly setose; outer plate of maxilliped with medial margin slightly invaginate and armed with 2 large blades medially and 3 long spines distally; gnathopods weak, slender, scarcely subchelate, gnathopod 1 with articles 5 and 6 subequal in length, palmar extent of article 6 defined by setae but dactyl extending for nearly full length of posterior margin, posterior edge of article 5 not lobate; gnathopod 2 with sixth article longer than unlobate fifth, dactyl extending only to setiferous definition of palm, dactyl with inner articulated spine; pereopods 1 and 2 very slender; pereopods 3 and 5 (4 missing) slender, unusually elongate, dactyl of pereopod 5 also unusually elongate; uropods 1 and 2 lacking peduncular processes; telsons of both specimens damaged and not clearly observed.

HOLOTYPE.—AHF No. 6137, juvenile, 2.2 mm.

TYPE-LOCALITY.—Station 7231, 27°24′00″ N, 115°12′15″ W, 2398–2475 m, Jan. 1, 1961.

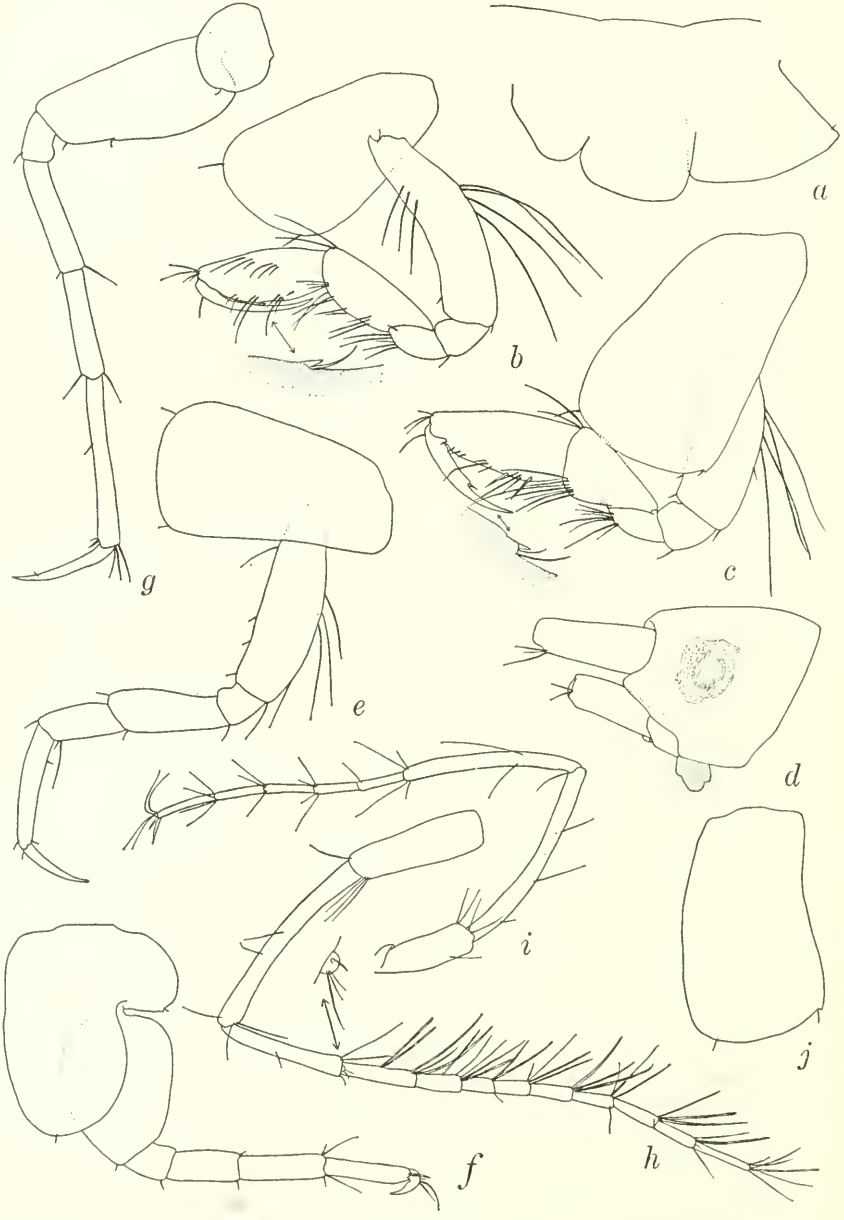


FIGURE 12.—*Photis* (*Cedrophotis*) *malinalco*, new species, holotype, juvenile, 2.2 mm, 7221: *a*, outline of pleonal epimera 1–3, left to right; *b,c*, gnathopods 1,2; *d*, head, with brain showing through translucent side, prebuccal complex darkened; *e–g*, pereopods 2,3,5; *h,i*, antennae 1,2; *j*, coxa 3.

Material.—Two specimens from the type-locality.

Relationship.—The youthfulness of the specimens probably accounts for the poor spination and setation on various appendages but the subgeneric characters are not the result of juvenility.

Ischyroceridae

Bonnierella Chevreux

Bonnierella palenquia, new species

Figure 13

Diagnosis.—Similar to *Bonnierella linearis* J. L. Barnard (1964b) in characters of head, pleon, telson, and generally in mouthparts but mandibular molar with 1 short seta, article 4 of maxillipedal palp shorter, and upper lip with slightly deeper excavation than in *B. linearis;* epistome with anterior cusp as in *B. l. californica* J. L. Barnard (1966a); gnathopods and pereopods generally like *B. l. linearis* but second articles of pereopods 3–5 slightly stouter; uropods distinct from those of *B. l. linearis*, as follows: distal end of peduncle of uropod 1 with three cusps, medial longest and nearly half as long as outer ramus and basally nearly twice as thick, base of inner ramus attached submarginally on shelf formed by medial cusp, ventromedial cusp slightly more than half as long as medial, lateral cusp about half as long as ventromedial; uropod 2 with sharp medioventral cusp about one third as long as outer ramus, medial cusp slightly more than half as long as other, lateral cusp obsolescent; uropod 3 similar to that of *B. l. californica.*

Holotype.—AHF No. 6130, female, 3.2 mm.

Type-locality.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

Material.—Two specimens from the type-locality.

Relationship.—The occurrence of more than one large distal cusp on the peduncles of uropods 1 and 2 distinguishes this species from all others in the genus. J. L. Barnard (1964b) has a key to those species but leaders 2 and 3 of couplet 1 are reversed and the key is recomposed in sequel.

Key to the Species of *Bonnierella*

1. Posterior margin of article 6 on male gnathopod 2 shorter than palm . . . 2
   Posterior margin of article 6 on male gnathopod 2 longer than palm 4
2. Uropod 1 with large distomedial peduncular cusp half as long as outer ramus, a shorter ventromedial cusp and a shorter lateral cusp, uropod 2 with two short distal peduncular cusps, one medial, one ventromedial.
   B. palenquia, new species

FIGURE 13.—*Bonnierella palenquia*, new species, holotype, female, 3.2 mm, 7358: *a*, mandible; *b*, telson; *c,d*, gnathopods 1,2; *e*, articles 6,7 of gnathopod 2, minus setae; *f–i*, pereopods 2,3,4 (broken), 5; *j–l*, uropods 1,2,3; *m*, maxilliped; *n*, epistomal cusp pointing left above lateral aspect of labrum; *o*, labrum, anterior aspect; *p,q*, maxilla 2, flattened and unflattened views; *r*, maxilla 1.

Uropods 1 and 2 each with a single ventromedial distal peduncular cusp, lateral and medial margins may have short spines in place of cusps . . . 3

3. Male gnathopod 1 nearly as large as gnathopod 2, palm weakly sculptured, palm of gnathopod 2 sinuous but lacking sharp teeth.
B. abyssorum (Bonnier)

Male gnathopod 1 much smaller than gnathopod 2, palm simple, palm of gnathopod 2 with three sharp teeth . . . . . **B. linearis** J. L. Barnard

4. Male gnathopod 1 much smaller than gnathopod 2, articles 5 and 6 subequal in length, palm simple . . . . . **B. lapisi** (J. L. Barnard)

Male gnathopod 1 nearly as stout as gnathopod 2, article 6 much longer than 5, palm either toothed or excavate and well defined 5

5. Palm of male gnathopod 1 with three large teeth, middle tooth subbifid, posterior portion of palm of gnathopod 2 with three distinct teeth, palm not excavate . . . . . **B. abyssi** Chevreux

Palm of male gnathopod 1 with one small but distinct tooth near dactylar base, middle of palm excavate and lacking teeth.
B. angolae J. L. Barnard

Lepechinellidae

Lepechinella Stebbing

***Lepechinella arctica turpis*, new subspecies**

Figures 14, 15

References to *Lepechinella arctica arctica*

Lepechinella sp. Schellenberg, 1924, p. 206, fig. (unnumbered).
Lepechinella arctica Schellenberg, 1926a, p. 394(footnote).
Lepechinella schellenbergi Stephensen, 1944, pp. 19–20, fig. 11—Gurjanova, 1951, pp. 677–678, fig. 465.

Diagnosis of adult.—Rostrum long, thin, reaching almost to end of first penduncular article of antenna 1; lateral cephalic margin with two short acute processes on each side; accessory flagellum 1- or 2-articulate, article 2 very small and appearing fused with first; palp article 3 of mandible longer than article 1; coxa 1 scarcely bifid, not extremely elongated, following coxae not strongly elongated or exceptionally bifid, dorsal surface of pereonite 1 with two long, erect, acute processes, each pereonite thereafter with one major process; commencing with pereonite 3, rudiments of additional process occur, thereafter increasing in size until tooth of pereonite 7 nearly as long as major process; pereonites 5 and 7 bearing additional rudimentary process; pleonites 1–3 with three dorsal teeth each, first two teeth erect, posterior tooth oblique and slightly longer than others; pleonite 4 with one oblique process; articulated spines occurring dorsally on all segments but not as densely as in *Lepechinella echinata* Chevreux; pleonites 5 and 6 coalesced; all pleonal epimera each with one slender posteroventral

tooth, margins above teeth convex, epimeron 2 with oblique row of lateral setae, 3 with scattered lateral setae; telson cleft slightly more than halfway, lobes slender, strongly gaping, apically bifid.

HOLOTYPE.—AHF No. 6025, male, 5.4 mm.

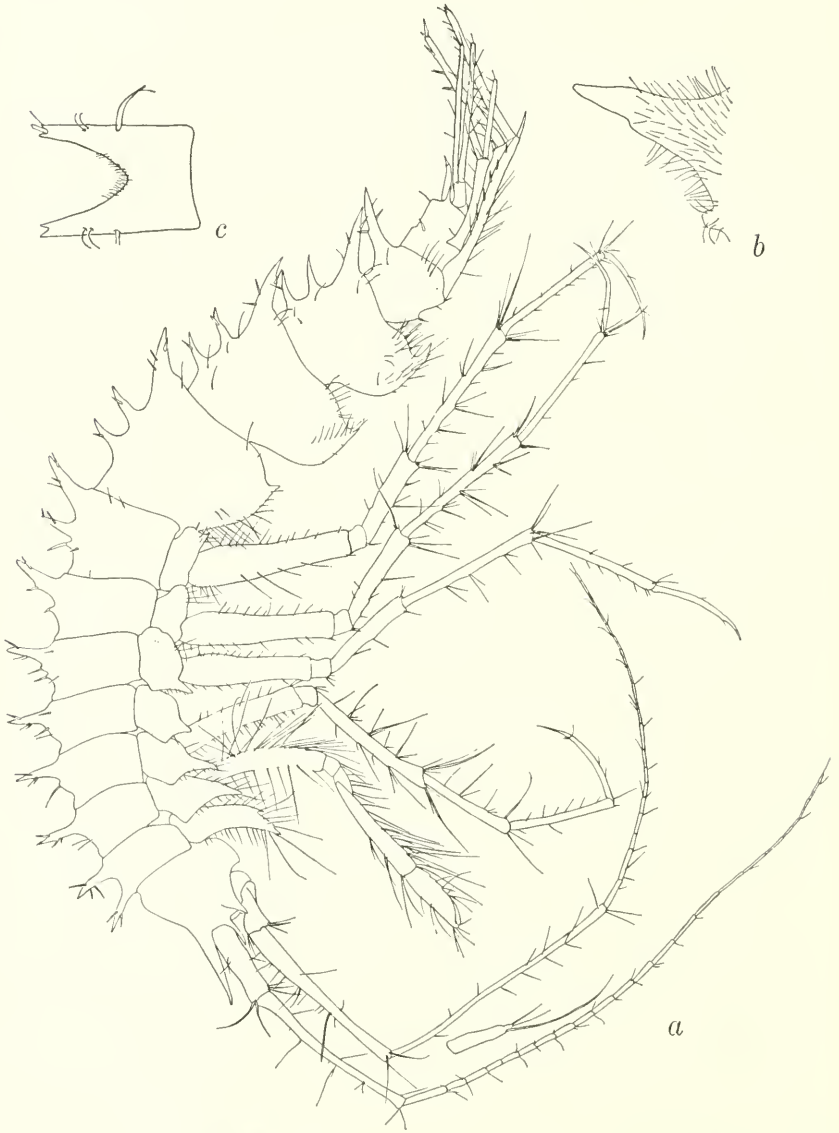


FIGURE 14.—*Lepechinella arctica turpis*, new subspecies, holotype, male, 5.4 mm, 7230: *a*, lateral aspect with accessory flagellum enlarged and offset; *b*, dorsal process of pereonite 6 enlarged to show example of small setules covering body; *c*, telson.

Type-locality.—Station 7230, 27°52′25″ N, 115°44′30″ W, 2667–2706, m, Dec. 31, 1960.

Material.—Stations 7229 (1), 7230 (2), 7358 (3).

Relationship.—This species is closely related to *L. chrysotheras* Stebbing (1908) but differs principally by the poorly bifid first coxa,

Figure 15.—*Lepechinella arctica turpis*, new subspecies, holotype, male, 5.4 mm, 7230: *a,b*, maxillae 1,2; *c*, labrum; *d*, articles 5–7 of gnathopod 2; *e*, mandible; *f*, lower lip (broken); *g*, maxilliped; *h*, gnathopod 1. Juvenile, 4.6 mm, 7229: *i,j*, coxae 1,2; *k*, articles 5–7 of gnathopod 2; *l*, dorsal processes of head and body, lower end representing head.

the less strongly developed dorsal teeth of the pereon and pleon, and the presence, on each side of the head, of two acute teeth shorter than the rostrum. The shapes of the sixth and seventh articles of gnathopod 1 also differ from those of *L. chrysotheras*.

The presence of lateral cephalic processes is characteristic of *L. arctica arctica* Schellenberg. Specimens at hand resemble that species closely but several small differences of subspecific importance occur in various structures. The lateral pair of cephalic processess is shorter than those of *L. a. arctica;* three large teeth occur on each of pleonites 1–3 instead of one large and one small, although *L. a. arctica* has the remnant of a third tooth on pleonite 1; the cleft of coxa 1 on *L. a. arctica* is much deeper than on *L. a. turpis*.

Juvenile specimens show the close relationship of the two subspecies more clearly than do adults. The accessory cusps on the dorsal body surface of a youthful specimen, 4.6 mm long from 7229, are rudimentary as in *L. a. arctica*, and three specimens about 3.7 to 4.0 mm long from 7358 lack accessory teeth altogether. In juveniles coxa 1 is more deeply bifid and coxa 2 more slender than in adults. The relative difference between the length of the rostrum and the lateral cephalic processes is less apparent in juveniles than it is in adults.

Probably the specimen of *L. arctica* figured by Gurjanova (1951) from the Polar Basin should be relegated to subspecific status also.

Distribution.—Middle Baja California, 1205–2667 m.

Liljeborgiidae

Liljeborgia Bate

Liljeborgia cota J. L. Barnard

Figure 1 *j–o*

Liljeborgia cota J. L. Barnard, 1962b, pp. 83–86, figs. 8, 9; 1966a, p. 64.

These small specimens, 4.0 mm long, differ from the large and supposedly terminal adults described by Barnard in having much larger dorsal teeth of the pleon, the shorter fifth article of antenna 2, the shorter and stouter fifth article of gnathopod 1, the weakly differentiated gnathopods and the more slender tooth of the third pleonal epimeron. These specimens resemble *L. fissicornis* (M. Sars) (see G. O. Sars, 1895, pl. 189) but, like adults of *L. cota*, differ from *L. fissicornis* in the shorter cleft of the telson and the nonerect teeth of urosomites 1 and 2.

A fragmental specimen from 7235 is probably not *L. cota;* it has

large teeth on pleonites 4 and 5 and a slightly enlarged tooth of the third pleonal epimeron.

Material.—Station 7358 (2).

Distribution.—Southern California to middle Baja California, 366–1821 m.

Lysianassidae

Nomenclature.—Unfortunately the nomenclature of several old diverse lysianassid genera is erroneous. The morphology and classification of various species in some of those genera are discussed in sequel as if there were no nomenclatural problems to add further to the confusion. The nomenclature cannot be stabilized in this writing without rendering the discussion of morphological characters unintelligible and, therefore, the necessary changes in names are ignored. Invalid names are marked with quotation marks throughout the text. A paper has been submitted to press by the writer clarifying some of the nomenclature and the following remarks anticipate that thesis.

Taxa Related to *Hippomedon, Schisturella,* "*Tryphosa,*" and *Uristes*

Several deep-sea lysianassids described in the last few decades have confounded the generic classification established by Sars (1895) and Stebbing (1906). The basic structure of that classification is nevertheless pristine.

The systematics of marine Gammaridea have always been based mainly on the fauna of Europe because few comprehensive revisions including extrinsic faunas have been made since 1906. But since that time numerous species and genera have been described outside of Europe. Some of the genera have been based on what were considered, at the time of their description, to be good qualitative characters but which have been linked, more and more, to some of the European genera through species with intergrading characters. On the other hand, some of the extrinsic species assigned to European genera because of general resemblance are now known to be strongly distinct in their generic characters. An example of the first case is the "*Lysianassa*-problem," in which extrinsic members of *Lysianassa* have been made the type-species of genera such as *Lysianopsis* (New England), *Aruga* (California), *Shoemakerella* (Caribbean Sea), *Arugella* (Indonesia), and *Pronannonyx* (SW Africa).

Lysianassidae of north boreal regions have been revised recently by Gurjanova (1962). She has established some criteria and set some precedents having critical value in reclassifying all Lysianassidae.

Hurley (1963) has also made an important contribution in the synonymization of several genera in the *Lysianassa* complex. J. L. Barnard (1962a) has synonymized several genera with *Uristes* and perhaps erroneously, as discussed in sequel, has made *Tmetonyx* a synonym of "*Tryphosa*."

The systematics of gammaridean families and genera is in no way near stability. Many of the "novelties" discovered in the deep sea in recent years apparently are not primitive but are highly specialized, even though simplified. The origin of these species is of considerable interest and their relationships to shallow-water faunas of polar regions or of low latitudes must be determined. In view of the underdeveloped state of gammaridean systematics it is prudent to conserve as many generic names as possible and not to discard them without good cause. It might be better to erect new generic names for the "novelties" rather than to tinker unceasingly with generic diagnoses in order to admit unusual species.

Many of the deep-sea lysianassids, which are difficult to classify, have affinities with *Hippomedon* Boeck, *Schisturella* Norman, "*Tryphosa*" auct., and *Uristes* Dana. Hurley (1963) has proposed two subfamilies in the Lysianassidae, the Lysianassinae and the Uristidinae. They include only a portion of the genera belonging to the Lysianassidae, but the genera listed above and those discussed in pages to follow presumably belong to Uristidinae. To avoid any implications that the genera discussed below represent all members of the Uristidinae, they are arranged into a hippomedon group, diagnosed in sequel. The major hippomedon group is then divided into a hippomedon section and a tryphosa section for the purpose of discussing affinities of those deep-sea species that have been difficult to classify.

The hippomedon group

Diagnosis.—Lysianassidae with mandibular cutting edge untoothed in middle, mandibular molar well developed, either strongly ridged or densely setulose, occasionally nearly smooth but remaining cuboidal and not becoming laminate or conical, palp attached level with molar; upper lip and epistome distinctly separated by a notch, incision or chitinous fold; mouthpart field with quadrate outline from lateral view; palp of maxilla 1 biarticulate, inner lobe with 1 and 2 nonfalcate setae; maxilla 2 with slender, apposed lobes, terminally setose, occasionally medial edge of medial lobe setose but medial lobe never pointing medially and never armed with large setae as in *Aristias* Boeck; maxillipedal palp 4-articulate, article 4 not vestigial, inner and outer plates well developed; gnathopod 1 distinctly subchelate, often minutely, palm oblique or transverse, never grossly chelate; coxa

2 large and equal in length to, or scarcely shorter than coxa 3; outer ramus of uropod 3 biarticulate; telson cleft one eighth or more, usually one third to three fourths.

Genera.—*Ambasiopsis* K. H. Barnard,* *Anonyx* Krøyer,* *Aristiopsis* J. L. Barnard, *Elimedon*, J. L. Barnard, *Eurythenes* Smith,* *Hippomedon* Boeck, *Lepidepecreoides* K. H. Barnard, *Neoambasia* Dahl,* *Onisimus* Boeck (some species), *Paracentromedon* Chevreux and Fage, *Pseudonesimus* Chevreux, *Schisturella* Norman, *Tmetonyx* Stebbing,* "*Tryphosa*" auct.* (=*Tryphosella* Bonnier), *Tryphosites* Sars, *Uristes* Dana.*

The hippomedon group may be divided into two sections, the first, with *Hippomedon* as representative, having the mandibular molar ridged and cuspidate but never covered with minute setules; the second, with "*Tryphosa*" as representative, having the mandibular molar essentially unridged but covered with minute scales or setules and thus appearing fuzzy, the shape of the molar often departing from the orthodox cuboidal shape by slight asymmetrical extension and attenuation but never becoming conical or laminate. *Genera of section 2 are marked with asterisks in the preceding list. *Tryphosites* is intermediate between the two sections.

Section 1.—Most of the deep-sea species of questionable classification belong with the hippomedon section of genera. They have asetulose mandibular molars that are often almost completely unridged. They are *Paracentromedon crenulatus* (Chevreux), *P. carabicus* J. L. Barnard, *Elimedon cristatus* J. L. Barnard, *Schisturella robusta* (J. L. Barnard) (described in *Ambasiopsis*), *Pseudonesimus abyssi* Chevreux, *Lakota adversicola* K. H. Barnard (also assigned to *Chironesimus*), and *Lakota rotundatus* K. H. Barnard (also assigned to *Chironesimus*), and several new species described herein. They and the types of various hippomedon-like genera are arranged in table 1 in relation to several morphological characters. The order in which the characters is arranged is a judgment of their classificatory importance. To illustrate the generic value of characters, one might commence with those of least importance to the right of table 1: (i) the tooth of the third pleonal epimeron in Lysianassidae is highly variable, although Gurjanova (1962) cites it as a diagnostic character of *Hippomedon;* (h) some characteristics of gnathopod 1 are diagnostic for some genera in the Lysianassidae (viz. scopelocheiras, *Opisa* Boeck, *Trischizostoma* Boeck); for instance, the alternatives among simple, subchelate and chelate gnathopods often are of classificatory value but in the group of species assembled in table 1 the state of the palm probably has no generic meaning even though some of the species

*See text to follow.

TABLE 1.—Characteristics of various genera and species in the hippomedon section (Col. a: 1=cuboidal and strongly ridged; 2=button shaped with medium ridging; 3=button shaped, subovate and poorly ridged. Col. b: 1=long and distally expanded; 2=long and rectangular; 3=shortened and tapered distally. Col. e: 1=normal length; 2=strongly shortened. Col. h: 1=palm transverse; 2=palm oblique; 3=palm obsolescent, extremely oblique. Symbols: *=epistome strongly produced; +=positive, 0=negative, +0=intermediate, ?=questionable)

	a	b	c	d	e	f	g	h	i	
	stage of mandibular molar	stage of coxa 1	uropod 2 incised	cleft of telson, percent	stage of mandibular palp article 3	head large (estimated)	upper lip strongly lobed	stage of gnathopod 1 palm	tooth of pleonal epimeron 3	Other characters
Onisimus, type-species	1	1	+	33	1	+	+0	3	+	
Tryphosites, type-species	1	1	+	75	1-2	+	*	2	+	
HIPPOMEDON										
Hippomedon, type-species	1	1	0	50	1	0	0	2-3	+	
Hippomedon strages J. L. Barnard	1	2	0	75	1	0	0	3	+	
Hippomedon tasmanicus J. L. Barnard	1	2-3	0	75	1	0	0	2	sl.	
Hippomedon kerguelensi (Miers)	1	2	0	75	1-2	0	0	2-3	+	
Elimedon, type-species	2	2	0	50	2	0	0	2	+	
Paracentromedon, type-species	2	2	0	67	1-2	+0	0	3	+	
Paracentromedon carabicus J. L. Barnard	3	1	0	75	2	0	0	2	+0	
Paracentromedon species (t.), Oregon [1]	2	2-3	0	63	2	0	0	2	+	
SCHISTURELLA										
Schisturella, type-species	2	3	+	75	1	?	+	3	0	
Schisturella robusta (J. L. Barnard)	2	3	+	50	2	+0	+	2	0	
Pseudonesimus, type-species	2	3	+	33	2	+0	0	1	0	
Lakota rotundatus K. H. Barnard	2-3	3	+	50	2	0	+	1	0	
Lakota adversicola K. H. Barnard	3	3	+	33		0	+	2	+	
Schisturella grabenis, new species	3	3	+	33	2	+0	+	3	+	
Lepidepecreoides, type-species	3	2	0	100	1	+0	+0	2	0	Coxa 5 elongate
Aristiopsis, type-species	2	3	+	33	2	+	0+	1	0	Gnathopod 1 slightly chelate; epistome-labrum elongate dorsoventrally.
Lepidepecreopsis, type-species	3	2	0	75	1	+	0	2	0	Mandibular molar smooth.
Tryphosoides, type-species	1	2	0	75	1	+0	0	2	+	Accessory flagellum vestigial.

[1] Species in process of description.

approach genera outside this group (e.g., the Lysianassinae of Hurley) because of the near simplicity of the palm; (g) degree of lobation of the upper lip often has generic value, but just as often does not; for instance, all species of *Lysianassa* Milne-Edwards have a lobate labrum (from lateral view) but occasionally the epistome is also lobate and masks the labrum; lobation of the labrum in *Anonyx*, (sensu Gurjanova, 1962) is highly variable; (f) the size of the head may have generic value but it is difficult to measure exactly and it has been described so infrequently that its use is reserved until its character value is better demonstrated; (e) the length and setation of mandibular palp article 3 appear to be highly variable in the species of several genera even though they have been used for the definition of *Elimedon*, closely allied to *Hippomedon;* (d) the depth of the telsonic cleft is variable in some lysianassid genera (*Onisimus*) and constant in others (*Lysianassa*) ; (c) incision of the inner ramus of uropod 2 is a variable character in *Anonyx*, as demonstrated by Gurjanova (1962) but is believed to be a stable generic character in Lysianassinae (sensu Hurley, 1963). The remaining two character alternatives (a, b, table 1) may have more value as generic criteria than the others. The length, shape and degree of tapering of coxa 1 are relatively stable except in the genus *Tmetonyx*. The mandibular molars of the hippomedon section not only differ from those of the tryphosa section but they differ within the hippomedon group in the degree of ridging.

A tendency to degeneration is seen in the order of species arranged in table 1. Typical species of *Hippomedon* have a long, distally expanded coxa 1, but in *Hippomedon strages* J. L. Barnard and *H. kergueleni* (Miers) the anterior and posterior margins of coxa 1 are parallel; this is also true of the type-species of *Elimedon and Paracentromedon.* In species of *Schisturella*, *Pseudonesimus*, and the remaining members incorrectly assigned to *Lakota*, the first coxa is reduced in length, tapers, is often covered partially by coxa 2, and may be very small and hemioval.

It is difficult to set generic limits in a series of progressive character modifications especially in view of the fact that occasional species have a unique combination of characters (e.g., the type-species of *Paracentromedon*). If no generic boundaries were drawn in the scheme of table 1 lysianassid systematics would, at the present state of development, disintegrate. A major discontinuity, however, seems to occur between *Paracentromedon carabicus* and *Schisturella pulchra* (see table 1). Above that discontinuity all species could be assigned provisionally to *Hippomedon*, taking into account the various levels of simplification in the loss of molar ridges and in the reduced expansion of coxa 1 in all deep-sea species. In this group the simplicity

of the inner ramus of uropod 2 is correlated with a fully elongated coxa 1. The second group of species is assigned to *Schisturella* (=*Pseudonesimus*). All schisturellas apparently have a similar mandibular molar, coxa 1, uropod 2 and, all except *Pseudonesimus abyssi*, have a lobate upper lip. The condition of the *Schisturella* telson varies considerably but this is also true of *Hippomedon* without including the species herein assigned. *Lakota adversicola* and *Schisturella grabenis* resemble *Hippomedon* in the occurrence of a tooth on pleonal epimeron 3. *Aristiopsis* is retained as a distinct genus in its combination of a schisturella-like coxa 1 with hippomedon uropod 2 and its nearly chelate gnathopod 1, plus the special configuration of its prebuccal outline.

Lepidepecreopsis Stephensen (1925), a genus fused to "*Tryphosa*" by Gurjanova (1951), demonstrates the difficulty of accepting the hippomedon and tryphosa sections as monophyletic groups. *Lepidepecreopsis* has all the characters of "*Tryphosa*" except for the occurrence of a nearly smooth, asetulose mandibular molar. *Lepidepecreopsis* could be assigned to the hippomedon section, but a more prudent course would be to regard it as a subgenus of "*Tryphosa*." Perhaps some of the aberrant species of *Hippomedon* have been derived from a tryphosa-like ancestry through loss of setules from the mandibular molar.

A precursor with normally expanded coxa 1 would resemble the type-species of *Tmetonyx*, *T. cicada* (Fabricius). In another direction one may consider that organisms like *T. cicada* evolved through tapering of coxa 1 into those other species now assigned to *Tmetonyx*, which through loss of the accessory tooth of the first gnathopodal dactyl came to resemble species of "*Tryphosa*."

J. L. Barnard (1962a) synonymized *Tmetonyx* with "*Tryphosa*" but a wiser course may be to reestablish *Tmetonyx* as a monotypic genus situated between *Anonyx* and "*Tryphosa*" and to allocate other species of *Tmetonyx* to a subgenus of "*Tryphosa*." The diagnostic characters of these and related genera are summarized in table 2. The evolutionary direction between *Tmetonyx cicada* and *Anonyx* is not apparent, as the two genera are so close. Because ridged and cuspidate mandibular molars are more common in gammarideans than are setulose molars, one must assume that *Hippomedon* stands closer to a primitive stem than do *Tmetonyx*, *Anonyx*, and "*Tryphosa*," at least as far as that one character is concerned.

The mandibular molar follows a trend of degeneration in the scheme of table 1. Its strong ridges and strictly cuboidal shape are lost, with the result that the molar becomes slightly flattened, somewhat rounded and bears only a few ridges or superficial imperfections. The condi-

TABLE 2.—Characteristics of genera in the tryphosa section (see table 1, p. 38, for legend).

	Coxa 1 tapering and slightly shortened	Epistome dominating upper lip	Inner ramus of uropod 2 incised	Head large (estimated)	Gnathopod 1 dactyl with large tooth	Maxilla 1 outer plate with spines reduced to 5	Other characters
Anonyx	0	0	+0	+	0	0	Gills pleated
Tmetonyx, type-species	0	+	0	+	+	0	
Tmetonyx, other species	+	+0	0	+	+	0	
Uristoides, type-species	+	+	0	0+	+	0	
Tryphosites	0	+	+	+	+0	0	
"*Tryphosa*," except type-species*	+	+	0	+	0	0	
Lepidepecreopsis, type-species	+	+	0	+	0	0	Mandibular molar asetulose.
Uristes	+	0	0	0	0	0	
Eurythenes	+	+	0	+0	0	0	Inner plate maxilla 1 heavily setose.
Neoambasia	+	0	0	?	0	+	Maxilla 1 aberrant.
Ambasiopsis	+	0	0	?	0	0	
(*Tryphosoides*)	0+	+	0	0+	0+	0	Mandibular molar prismatic. Accessory flagellum vestigial.

*Type-species synonymous with *Orchomene*.

tion of mandibular palp article 3 is intragenerically variable. The incision of the inner ramus of uropod 2 is consistently present in the species assigned to *Schisturella* and absent from those of *Hippomedon*. Telsonic clefts vary to some extent although a slight progression occurs in table 1 from the fully cleft condition of *Hippomedon* to the poorly cleft condition of *Pseudonesimus* and the "lakotas." Lobation of the upper lip occurs in the lakotas and *Schisturella* but not in *Pseudonesimus*, *Paracentromedon*, *Elimedon*, or *Hippomedon*. Gnathopodal and epimeral conditions are ignored.

Despite the intrasectional variability of first coxae, mandibular molars, uropodal incisions, telsons, and upper lips, the outer lobe of maxilla 1 differs fairly consistently between the two sections. The main terminal group of 5 or 6 spines on the outer lobe of maxilla 1 consists of very stout members in hippomedons, and thin members in tryphosas. The type-species of *Schisturella* is slightly aberrant in its maxillary spines.

Intergradations between the characters of the types of *Hippomedon* and *Schisturella* are seen not only in those species now assigned to *Paracentromedon* but also in several species now assigned to *Hippomedon*. Indeed, because it is like "*Tryphosa*," the first coxa of *Hippom-*

edon tasmanicus J. L. Barnard is even more abnormal than is that of *H. strages* J. L. Barnard and that of *H. kergueleni* (Miers).

All members of *Hippomedon* resembling the type-species in coxa 1 and mandible occur in northern waters, whereas those differing from the type occur in southern waters, regardless of depth.

Section 2.—These genera, like "*Tryphosa*," have a setulose but unridged mandibular molar. They have close affinities but can be divided into genera by characteristics of coxa 1 as in the hippomedon section. The contrast in shape of coxae is best seen by comparing the diverse assemblage of species in *Anonyx* and "*Tryphosa*." The first genus has a long, distally expanded coxa 1, whereas the latter has a slightly shortened and distally tapering coxa 1. If those attributes are accorded rank over variables in upper lip, epistome, and gnathopods, then several species must be transferred from one genus to another and perhaps the genus *Tmetonyx* reinstated, as previously discussed. On the other hand, the suggestion is made below (see *Uristes perspinis*) that anonyx and tryphosa groups be established, with species allocated to various subgenera. The diagnostic characters of the genera are shown in table 2.

Notes on other species.—Under the title *Uristes perspinis* is a discussion of the characters that subgenerically distinguish *Uristes lepidus* J. L. Barnard (1964b) from other members of the "tryphosa" section.

Tryphosites (?) *coxalis* J. L. Barnard (1962a) should be removed from that genus to which Barnard questionably assigned it, because of the absence of a constriction on the inner ramus of uropod 2. The positive and negative alternatives of that character are seen to be relatively consistent generically and are confounded only by *Anonyx* (see Gurjanova, 1962). In addition, coxa 1 of *T.* (?) *coxalis* resembles that of "*Tryphosa*" but the mandibular molar has both ridges and setules. Although the ridged molar suggests the referral of *T.* (?) *coxalis* to *Hippomedon* of table 1, the reduction of coxa 1 is believed to exceed the limits herein set for *Hippomedon*. The epistome is produced subacutely as in the type-species of *Tryphosites* but it assumes a lesser importance as a generic character than do coxa 1 and the incision of uropod 2, in view of the arrangements made in tables 1 and 2. Indeed, *Tmetonyx serratus* Schellenberg (1931) has a similar epistome and thus is a parallel case. Except for the mandibular molar, *Tryphosites* (?) *coxalis* is essentially a member of "*Tryphosa*" (table 2) and should be removed to that genus until a further study of the minute molarial details can be made.

Gurjanova (1962) did not transfer *Tmetonyx nobilis* (Stimpson) (see review by Shoemaker, 1930) to *Anonyx* even though it strongly

resembles other species of *Anonyx*. It is a member neither of *Tmetonyx*, nor of "*Tryphosa*" according to table 2 herein, because the dactyl of gnathopod 1 has no large inner tooth and the epistome does not dominate the upper lip. The inner ramus of uropod 2 is not incised. Gills are not pleated as they are in typical members of *Anonyx* but Hurley (1963) has questioned that condition as a generic criterion. *Tmetonyx nobilis* is nevertheless an aberrant anonyx, in that coxa 1 is unexpanded distally and its anterodistal margin is obliquely rounded. Thus, it approaches the minimal condition of "*Tryphosa*." Its head and prebuccal complex are not sufficiently reduced in size to assign *T. nobilis* to *Uristes*. Probably it should be removed to a new subgenus created for assignment to *Anonyx*. If its molar is asetulose then it falls into *Hippomedon*.

Tryphosoides falcatus Schellenberg (1931), the type and unique species, was synonymized with *Uristes* by J. L. Barnard (1962a), who disregarded several of the characters considered to be important by Schellenberg and who also at that time did not recognize the intergeneric differences of mandibular molars. The molar of *T. falcatus* is prismatic, thus apparently equivalent to stage 2 of table 1 and therefore the species is not assignable to *Uristes* or to any of those genera in the tryphosa group of table 2. On the other hand *Tryphosoides* does not precisely fit any of those levels of *Hippomedon* in table 1 in view of the distinctly shortened article 5 of gnathopod 1. Perhaps the genus stands closest to *Lepidepecreopsis*, a member of the hippomedon section which is simply a tryphosa lacking molar setules. *Tryphosoides* parallels *Lepidepecreopsis* in the sense that the former is simply a *Tmetonyx* lacking molar setules. Because the evolutionary direction of molarial changes is not known one may reverse the statement and say that tmetonyxes are simply species of *Tryphosoides* with nonprismatic, setulose molars. If *Lepidepecreopsis* were to be retained as a valid genus then so must *Tryphosoides*, because the latter has several other characters of at least subgeneric value: e.g., a reduced accessory flagellum. Because the dactylar tooth of gnathopod 1 is very small and because the head may be small (unclear) and coxa 1 is intermediate between that of *Tmetonyx* (s.str.) and "*Tryphosa*," *Tryphosoides falcatus* stands close to *Uristes* and might be said to be a *Uristes* lacking molar setules. Thus, *Tryphosoides* should be retained at least in subgeneric status with *Uristes* until a monographer of the Uristidinae can determine its true affinities.

242-332—67——4

Acidostoma Liljeborg

Acidostoma obesum ortum, new subspecies

FIGURES 16–18

DIAGNOSIS OF FEMALE AND JUVENILE.—Lateral cephalic lobe subquadrate, poorly projecting in juvenile, more strongly subconical in adult; eyes absent; mouthparts generally like those figured by Shoemaker (1930) for *Acidostoma laticorne* Sars except where noted or figured; mandibular molar a simpler, more slender cone than that of *A. laticorne*; lower lip similar; inner lobe of maxilla 1 similar in shape but asetose in juvenile; maxilla 2 weakly to strongly setose; outer plate of maxilliped similar, lacking medial excavation in juvenile, with small medial folding notch in adult, palp article 4 shorter than in *A. laticorne*; palm of gnathopod 1 very slightly convex, article 6 stouter than in typical subspecies, armed with evenly spaced, short setae, palm about equal to posterior margin of article 6 in juvenile, slightly shorter in adult; dactyl of gnathopod 2 straight, formed of two parts (more clearly apparent in juvenile), probably basal portion being armed with partially fused short, thick spine; pereopods 3–5 with sharper distal corners of articles 4–6 than in typical subspecies; pereopod 5 lacking strong spines on anterior margin of article 6; third pleonal epimeron with slightly prolonged posteroventral corner but no distinct tooth; dorsal margin of pleonite 4 straight; peduncle of uropod 2 expanded but not pectinate or castellate; telson slightly longer than broad, cleft slightly more than two-thirds of its length, similar to *A. nodiferum* Stephensen (1923). Male unknown.

HOLOTYPE.—AHF No. 6123, female, 7.5 mm.

TYPE-LOCALITY.—Station 7231, 27°24′00″ N, 115°12′15″ W, 2398–2475 m, Jan. 1, 1961.

MATERIAL.—Holotype and juvenile, 2.8 mm, from the type-locality.

REMARKS.—The head of the adult protrudes strongly below the insertion of antenna 2, a situation opposite to that indicated by Sars (1895) in the description and figures of the typical subspecies, *A. obesum obesum* (Bate). The absence of eyes and the slight difference in shape of gnathopod 1 and pereopods 3–5 are of little systematic importance. Other species in the genus differ from *A. obesum* in much more remarkable ways than do these specimens.

Dahl (1964) calls attention to the taxonomic importance of the preformed folding line marked with a medial excavation on the outer plate of the maxilliped. The outer plate is folded around the other mouthparts perhaps to seal off leakage into the sucking chamber formed by the mandibles and lips. Only three of the known seven species of the genus have the medial excavation on the outer plate but

apparently all have the outer plate of the maxilliped permanently folded as the figures indicate. The writer has examined two other species lacking the preformed folding notch and the outer plates nevertheless seem permanently folded; they are very difficult to straighten or flatten. In terms of maxillipedal outer plate and third

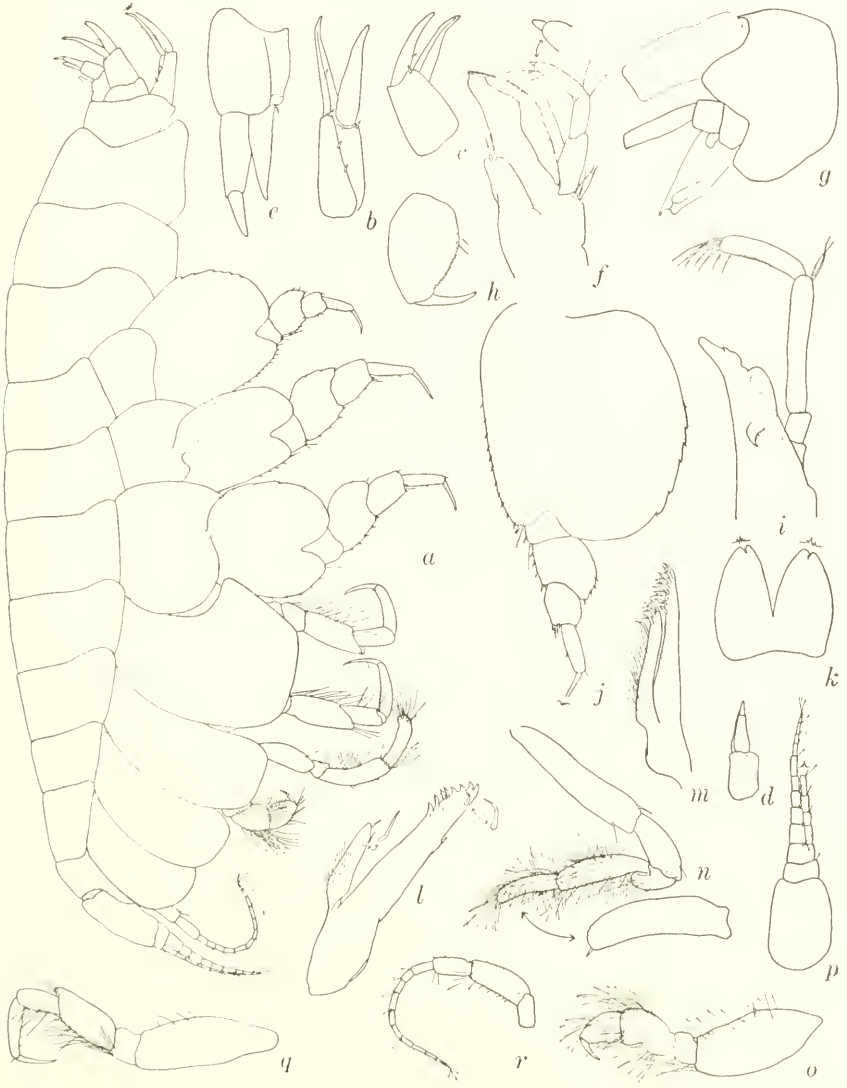


FIGURE 16.—*Acidostoma obesum ortum*, new subspecies, holotype, female, 7.5 mm, 7231: *a*, lateral aspect; *b–e*, uropods 1,2,3 (3 enlarged); *f*, maxilliped, outer plate folded; *g*, head (stippled portion=epistome); *h*, articles 6,7 of gnathopod 1, minus setae; *i*, mandible; *j*, pereopod 5; *k*, telson; *l,m*, maxillae 1,2; *n,o*, gnathopods 2,1; *p*, antenna 1, accessory flagellum (broken); *q*, pereopod 2; *r*, antenna 2.

pleonal epimeron the new subspecies (not the juvenile) resembles *Acidostoma laticorne* Sars but it differs from that species by the straight dorsal margin of pleonite 4, the straight (not hooked) dactyl of gnathopod 2, by the longer and more deeply cleft telson, and the shorter palp article 4 of the maxilliped.

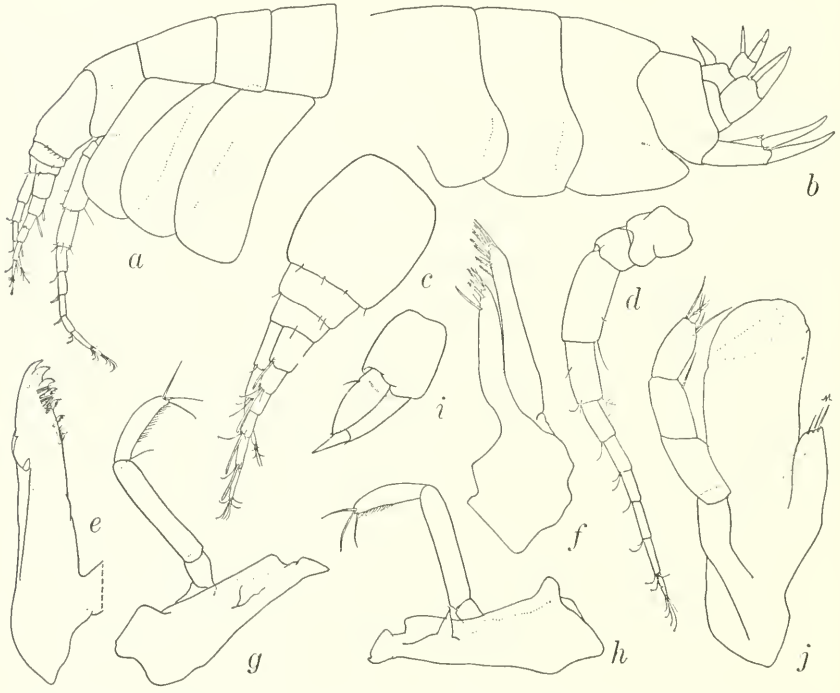


FIGURE 17.—*Acidostoma obesum ortum*, new subspecies, juvenile, 2.8 mm, 7231: *a*, anterio-end, left lateral; *b*, pleon; *c,d*, antennae 1,2; *e,f*, maxillae 1,2; *g,h*, mandibles; *i*, uropod 3; *j*, maxilliped, showing folding lines on outer plate.

Acidostoma pectinatum Gurjanova (1962) has a distinctively subcastellate dorsal peduncular margin on uropod 2 and numerous other differences from *A. obesum*. *Acidostoma molariferum* Margulis (1963) and *A. hancocki* Hurley (1963) have short, broad telsons and stronger teeth on the third pleonal epimeron than does the new subspecies.

FIGURE 18.—*Acidostoma obesum ortum*, new subspecies, juvenile, 2.8 mm, 7231: *a,b*, gnathopod 1; *c,d*, gnathopod 2, offset of *d* is dactyl; *e–i*, pereopods 1,2,3,4,5.

Ambasiopsis K. H. Barnard

Ambasiopsis (?) *fomes*, new species

FIGURES 19, 20

DIAGNOSIS.—Lateral cephalic lobes strongly projecting, moderately broad, asymmetrical, acute; eyes absent; antennae very short, antenna 2 not exceeding antenna 1 in length; prebuccal complex small, upper

lip anteriorly lobate but poorly so, projecting anterior to flattened epistome; mandibular molar complex, anteriorly setulose, posteriorly bearing minute cusps and ridges; mandibular palp linear, slender,

FIGURE 19.—*Ambasiopsis* (?) *fomes*, new species, holotype, ?male, 2.66 mm, 7249: *a*, mandible; *b*, head; *c*, urosome; *d*, maxilliped; *e*, telson; *f,g*, maxillae 1,2; *h,i*, uropods 2,3; *j–l*, pleonal epimera 1,2,3, right aspects.

article 3 about 60 percent as long as article 2, setae short, marginal and terminal on distal third of article; major spines of outer plate of maxilla 1 of stout hippomedon-like form; outer plate of maxilliped bearing discrete medial and apical spines; gnathopod 1 perfectly subchelate, palm transverse, defined by two spines, article 6 rectangular, longer than 5, latter lacking posterior lobe, dactyl having distal nail

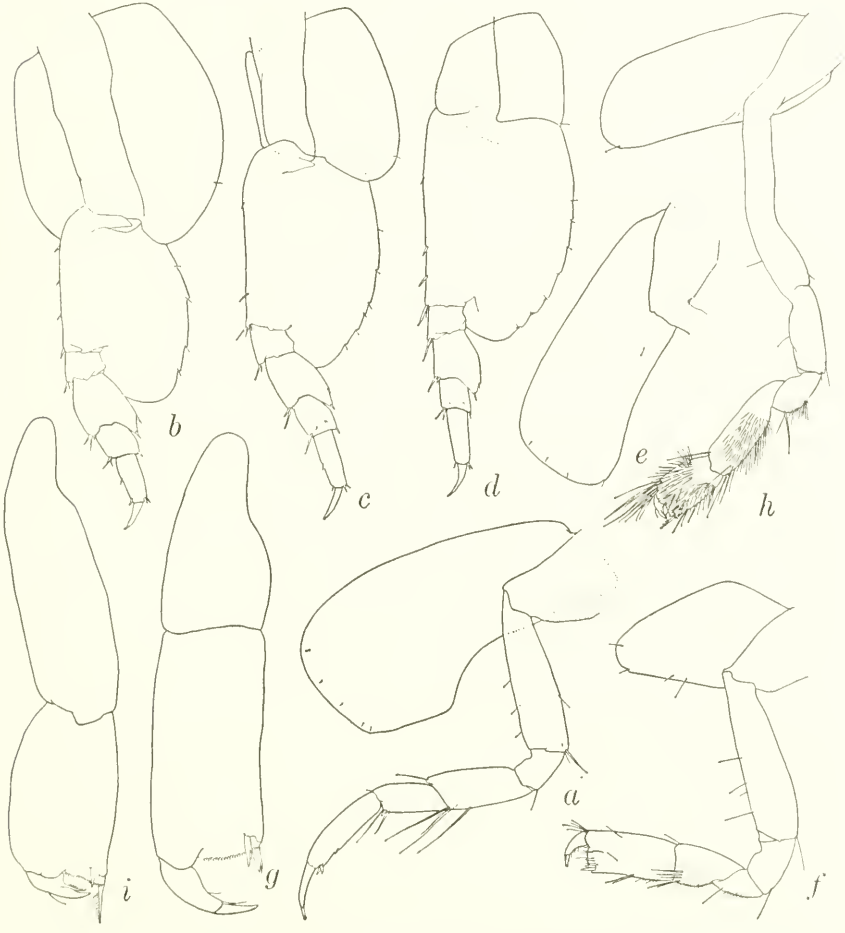


FIGURE 20.—*Ambasiopsis* (?) *fomes*, new species, holotype, ?male, 2.6 mm, 7249: *a–d*, pereopods 2,3,4,5; *e*, coxa 3; *f,g*, gnathopod 1; *h,i*, gnathopod 2.

and accessory seta; coxa 1 generally tryphosa-like but somewhat smaller and tapering more strongly (neither as slender nor as elongated as in type-species of *Ambasiopsis*); gnathopod 2 subchelate, dactyl large and attached fully anteriorly, palmar corner bearing two large spines; pereopods 1 and 2 simple, poorly setose, sixth articles

armed distally with one pair of simple spines; coxa 4 with quadrate posterodistal lobe, corners blunt; pereopods 3–5 remarkably similar among themselves, posteroventral corners of lobes on second articles rounded, stenopodous articles (3–7) successively more slender, fourth articles poorly expanded and weakly produced distoventrally; posteroventral corner of first pleonal epimeron rounded but bearing microscopic tooth, corners of epimera 2 and 3 sharply quadrate, bearing microscopic teeth, posterior margins nearly straight; pleonite 4 dorsally straight from lateral view, slightly elevated above following pleonite; uropods 1 and 2 bearing lateral peduncular spines, one spine on outer rami, two on inner, inner ramus of uropod 2 not incised; inner ramus of uropod 3 scarcely exceeding article 1 of outer ramus; telson longer than broad, cleft two thirds of its length.

Holotype.—AHF No. 6131, male, 2.6 mm. Unique.

Type-locality.—Station 7249, 27°36′25″ N, 115°56′25″ W, 3705–3745 m, Jan. 4, 1961.

Relationship.—The generic assignment of this species is uncertain. Coxa 1, uropod 2, and the mandibular molar resemble those of "*Tryphosa*" but the maxillary spines are as stout as those of *Schisturella* and *Pseudonesimus* (both genera are considered synonymous herein). Coxa 1 and the mandibular molar, however, are more specialized than in typical tryphosas; the first coxa is slightly smaller than that of "*Tryphosa*" and resembles that of *Schisturella grabenis*, new species; the mandibular molar is smaller than that of typical "*Tryphosa*" (and *Uristes*), and has very few setules and a few faint ridges and cusps. The intermediacy of these characters suggests a link between tryphosas and schisturellas. This link would contradict a presumption that schisturellas have been derived from hippomedon-like ancestors through reduction of first coxae, because it indicates that tryphosas with first coxae already reduced but with setulose molars may have been modified through reduction of setules. On the other hand, schisturellas may be polyphyletic and have originated from both tryphosas and hippomedons. *Ambasiopsis fomes* differs from all species of *Schisturella* by the simple inner ramus of uropod 2.

The new species is assigned provisionally to *Ambasiopsis* K. H. Barnard (see 1932) because of the partially setulose mandibular molar, the general reduction (but not overall shape) of coxa 1 and the shape of the upper lip and epistome. *Ambasiopsis* differs from "*Tryphosa*" especially in the prebuccal complex, which in *Tryphosa* has a lobate epistome dominating the upper lip, whereas the reverse is true of *Ambasiopsis*. *Ambasiopsis fomes* differs from the type-species of *Ambasiopsis* by the presence of spines on the outer plate of the maxilliped, the tryphosa-like shape of the reduced first coxa and espe-

cially by the completely subchelate gnathopod 1. K. H. Barnard (1932, p. 45) stated that only 7 spines occur on the outer plate of maxilla 1 of the type-species, *A. georgiensis*, whereas 10 (6 large and 4 small) occur on the specimen at hand.

Anonyx Krøyer

Anonyx carinatus (Holmes)

Lakota carinata Holmes, 1908, pp. 498–500, fig. 9.—Thorsteinson, 1941, p. 56, pl. 2, figs. 16, 17.—Gurjanova, 1962, pp. 302–303, fig. 100.
Anonyx carinatus.—Hurley, 1963, pp. 103–108, figs. 32–34.

Material.—USNM Acc. No. 247045, Santa Monica Bay, Calif., hagfish trap, 183 m (1).

Distribution.—Gulf of Alaska (from halibut stomach) to border between California and Mexico, known depth in southern California, 15–205 m, rare in depths shallower than 70 m.

Aristias Boeck

Aristias expers, new species

Figure 21

Diagnosis.—Eyes absent; lateral cephalic lobes quadrate, apically rounded; epistome and upper lip separated by deep sinus, both projecting equally forward; flagellum of antenna 1 with 5 articles, accessory flagellum with 3 articles; palp article 3 of mandible shorter than article 2, poorly setose and crescentic; outer plate of maxilliped exceeding palp article 3; gnathopod 1 stout, with small spinose protuberance on palmar margin; articles 5 and 6 of gnathopod 2 short in comparison to *A. neglectus* Hansen; pereopods poorly spinose, article 2 of pereopod 5 with parallel margins, articles 3–7 together equaling length of article 2; pleonal epimera with convex posterior margins, posteroventral corners rounded-quadrate; urosomite 1 slightly convex dorsally, urosomite 3 large, bearing short dorsolateral ridges partially hiding telson from lateral view; each ramus of uropod 1 with one deeply set spine, inner ramus with additional marginal spine; each ramus of uropod 2 with enlarged marginal spine inserted in large notch, inner ramus with additional marginal spine; inner ramus of uropod 3 as long as outer ramus, rami not spinose; telson short, cleft one third of its length, each lobe with two apical setules.

Holotype.—AHF No. 6119, male, 5.0 mm. Unique.

Type-locality.—Station 7231, 27°24′00″ N, 115°12′15″ W, 2398–2475 m, Jan. 1, 1961.

Relationship.—This species differs from all others in the genus by the very short cleft of the telson. Four other blind species have been

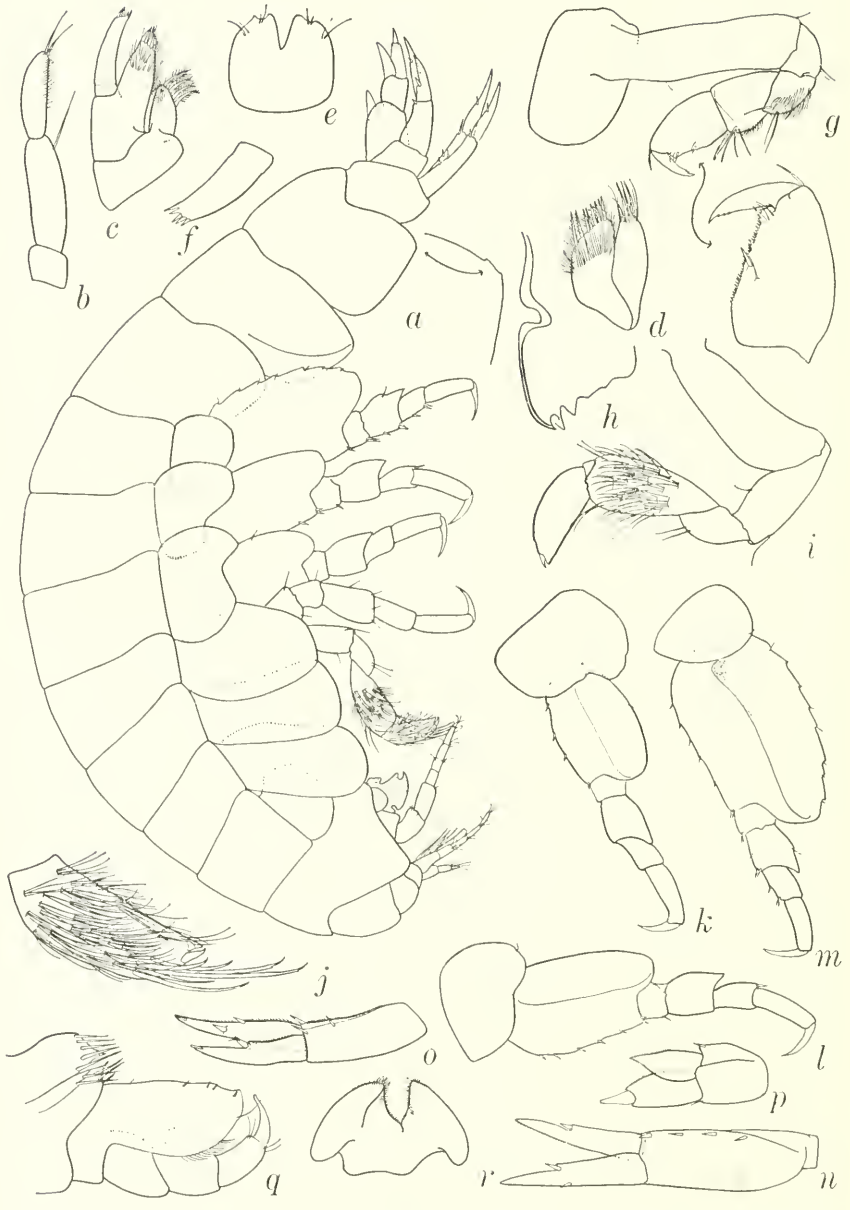


FIGURE 21.—*Aristias expers*, new species, holotype, male, 5.0 mm, 7231: *a*, lateral aspect; *b*, mandibular palp; *c,d*, maxillae 1, 2; *e*, telson; *f*, palp of maxilla 1; *g*, gnathopod 1; *h*, epistome-labrum complex, left side; *i,j*, gnathopod 2; *k–m*, pereopods 3,4,5, *n–p*, uropods 1,2,3; *q*, maxilliped; *r*, lower lip.

described: *Aristias topsenti* Chevreux (1900), *A. microps* Sars (1895), *A. falcatus* Stephensen (1923) and *A. adrogans* J. L. Barnard (1964d). In characters other than the telson, *A. expers* differs from these as follows: from *A. topsenti* by the weak development of the wing-like ridges of urosomite 3; from *A. microps* by the subacutely and more strongly produced lateral cephalic lobes; from *A. falcatus* by the narrower distal end of article 6 of gnathopod 2 and the poor development of spination on the inner rami of uropods 1 and 2; and from *A. adrogans* by the poor spination of the uropods and the larger urosomite 3. The new species and *A. adrogans*, both Pacific species, seem most closely related.

Aristias expers resembles three oculate species. It differs from its sympatriot *Aristias veleronis* Hurley (1963) by the shortness of the stenopodous portion of pereopod 5, the stouter gnathopod 1, and the apparent absence of small cusps on the pleonal epimera. It differs from *A. japonicus* Gurjanova (1962) primarily by the shorter inner ramus of uropod 3 and the small size of the spines of the telson. It differs from *A. antarcticus* Walker (see 1907) by the stoutness of the first gnathopod, the elongated accessory flagellum and the small size of the dactyl of gnathopod 2.

The first maxillary palp of *A. expers* superficially appears to be uniarticulate, the division between articles 1 and 2 being nearly obfuscated. As in other species of *Aristias* the inner and outer plates of maxilla 1 of *A. expers* are not as divergent as in *A. neglectus* Hansen (see Sars, 1895, pl. 17, fig. 2).

Aristiopsis J. L. Barnard

Aristiopsis tacita J. L. Barnard

FIGURE 22

Aristiopsis tacitus J. L. Barnard, 1961, p. 31, fig. 2.

This species, described from the Tasman Sea, is now demonstrated to be of widespread occurrence in the Pacific Ocean. The specimen at hand differs in no significant character from that originally described, except in the slightly different shape and stronger setae of article 2 on pereopod 5. Some of the mouthparts are illustrated in finer detail than before. Apparently uropod 2 was erroneously described and figured because it is the inner and not the outer ramus that has the dorsal constriction on the specimen at hand. The appendage as shown on the body was incorrectly rendered by Barnard (1961), although one may see on the enlarged version that it is the inner and not the outer ramus which is constricted because the major peduncular

spines demonstrate the true position of the lateral margin of the appendage.

Material.—Station 7234, male, 3.4 mm.

Figure 22.—*Aristiopsis tacita* J. L. Barnard, male, 3.4 mm, 7231: *a*, uropod 2; *b*, mandible; *c*, articles 6,7 of gnathopod 2; *d*, pereopod 5; *e*, outer lobe of maxilla1; *f*, epistome-labrum complex, left side; *g*, mandibular molar; *h*, maxilliped; *i*, coxa 1, medial view from left aspect; *j*, maxilla 2.

Distribution.—Tasman Sea and the northeastern Pacific Ocean, 842–3580 m.

Cyphocaris Boeck

Cyphocaris anonyx Boeck

Cyphocaris anonyx Boeck.—Hurley, 1963, p. 25 (with references).

Material.—Stations 7229(2), 7235(2).

Distribution.—Cosmopolitan in bathypelagic depths.

Euonyx Norman

Euonyx laqueus, new species

Figures 23, 24

Diagnosis.—Eyes absent or poorly developed; lateral cephalic lobe projecting forward subobtusely; epistome and upper lip fused together and asymmetrically sinuous on anterior margin; articles 5 and 6 of gnathopod 1 subequal in length; palm of gnathopod 2 much shorter than posterior margin of article 6 but excavate and nearly transverse; article 4 of pereopods 3–5 very broad, slightly tapering distally but not produced strongly posterodistally; pleonal epimera 2 and 3 with acutely but slightly produced posteroventral corners; urosomite 1 lacking dorsal process. Accessory flagellum with 8–10 articles.

Holotype.—AHF No. 6111, male, 19.0 mm.

Type-locality.—Allan Hancock Foundation Acc. No. 1961–15, 61A6–41A, Sept. 11, 1961, 8.5 mi west of San Benitos Islands, Baja California, 28°20′ N, 115°45′ W, 1187 m, deep-sea free trap (suspended above bottom), bottom depth not recorded.

Material.—26 specimens from the type-locality.

Relationship.—This species differs from *E. talismani* Chevreux (1919, see 1927 for figures) in the lack of well-marked eyes, the more rounded lateral cephalic lobe and the shorter and less excavate palm of gnathopod 2.

It differs from *E. chelatus* Norman (see Sars, 1895, pl. 40, fig. 1) by the absence of a carina on urosomite 1 and the rounded, not acutely produced epistome.

Euonyx coecus Pirlot (1933) has a shorter fifth article of gnathopod 1 and the shapes of pereopods 3–5 differ from those of *E. laqueus*.

Euonyx normani Stebbing (1888) has a very short fifth article of gnathopod 1 and very slender articles 4–6 of pereopods 3–5.

Euonyx biscayensis Chevreux (1908 and see J. L. Barnard, 1961) has a very short, nonexcavate palm on gnathopod 2. Possibly the material at hand represents a subspecies of *E. biscayensis*.

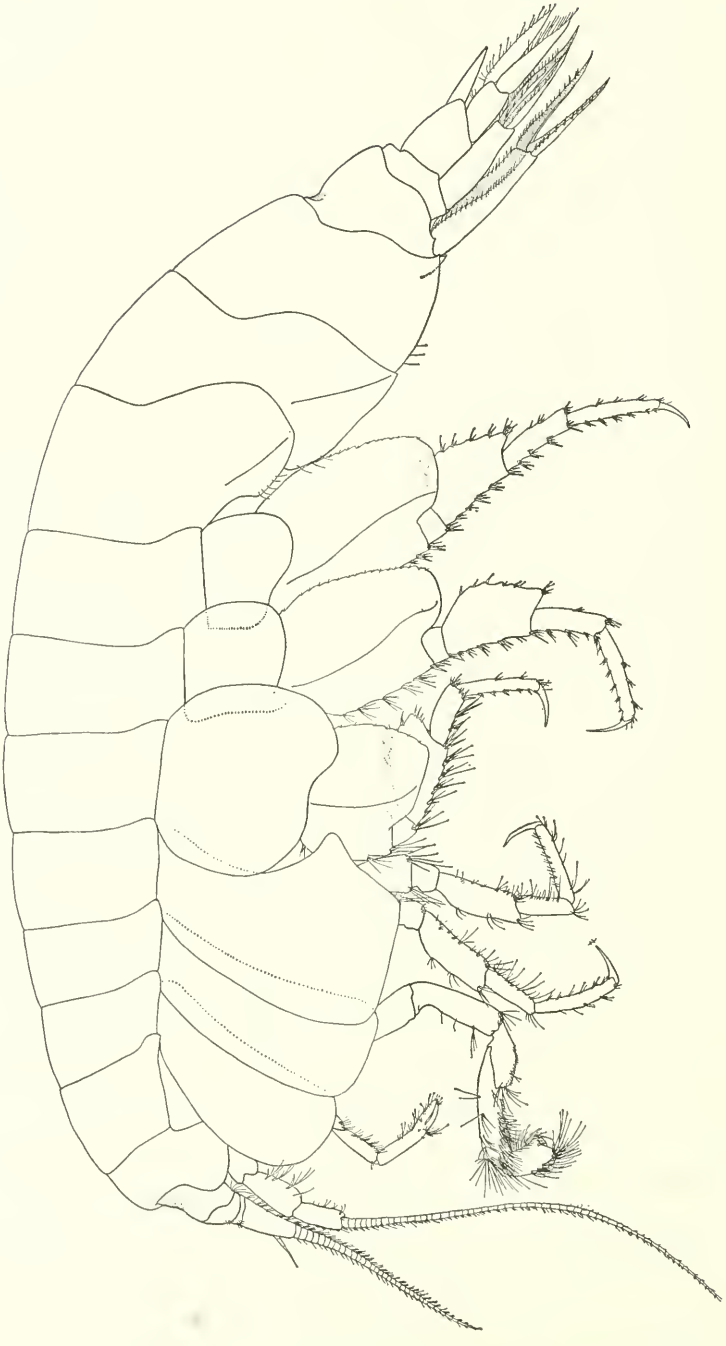


FIGURE 23.—*Euonyx laqueus*, new species, holotype, male, 19.0 mm; Acc. No. 1961-15, lateral left aspect.

FIGURE 24.—*Euonyx laqueus*, new species, holotype, male, 19.0 mm, Acc. No. 1961-15: *a*, head, epistome-labrum complex, and pereonite 1 and its coxal plate; *b*, uropod 2; *c*,*d*, gnathopod 1; *e*, maxilliped; *f*, pereopod 1; *g*, peduncle of antenna 2; *h*, mandibular molar; *i*, maxilla 2; *j*, inner plate of maxilliped minus setae; *k*, lower lip; *l*, mandible; *m*, gnathopod 2; *n*, uropod 3; *o*, maxilla 1; *p*, telson.

Euonyx pirloti Sheard (1938) has a shorter article 5 of gnathopod 1 than does *E. laqueus*, a rounded posteroventral corner on pleonal epimeron 3, and bears dark eyes. Gnathopod 2 of *E. pirloti* has a poorly defined palm and short dactyl.

Euonyx conicurus K. H. Barnard (1925) has a large, erectly acute process on urosomite 1 and a poorly developed palm of gnathopod 2.

Eyes are represented on some specimens of *E. laqueus* by a faint pink, t-shaped stain as shown on one of the figures. No specimens are ovigerous but some have rudimentary brood plates. Gills are complex and some bear accessory appendages but their condition is highly variable owing to preservational shrinkage and length of time in the instars; on some specimens the gills are enormously swollen, opaque and turgid and on others the gills are but thin shells of what they must have been in life.

Orchomene Boeck, new synonymy

Orchomene Boeck, 1871, p. 114 [Type-species: *Anonyx serratus* Boeck, 1861 (selected by Boeck, 1876)].

Tryphosa Boeck, 1871, p. 117 [Type-species: *Anonyx nanus* Krøyer, 1846 (selected by Boeck, 1876)].

Orchomenella Sars, 1895, p. 66 [Type-species: *Anonyx minutus* Krøyer, 1846 (original designation)].

Orchomenopsis Sars, 1895, p. 73 [Type-species: *Orchomenopsis obtusa* Sars, 1895 (monotype)].

The type-species of *Tryphosa* and *Orchomenella* are undoubtedly congeneric; the confusion arose when Sars (1895) misidentified *Anonyx nanus* and erected, for his material, the new name *Orchomenella ciliata*. The material he named *Anonyx nanus* was, in reality, a new species, named *Tryphosella sarsi* by Bonnier (1893), and later transferred to *Tryphosa* by Stebbing (1906). Stebbing failed to note that *Tryphosa* and *Orchomenella* were, therefore, synonymous since *Anonyx nanus* Krøyer and *A. minutus* Krøyer are congeneric. Because the type-species of *Orchomenella* was correctly identified by Sars there can be no application of article 70a of the ICZN code.

Even though Boeck had erected *Tryphosa* in 1871 and later designated its type as *A. nanus*, the concept of the genus has stemmed from Sars' diagnosis, followed by Stebbing (1906), and essentially based on what came to be called *Tryphosa sarsi* (Bonnier). The large group of species, known since 1906 under the name of "*Tryphosa*" as congeners of *T. sarsi* must, therefore, be accorded another generic name. The next available name is *Tryphosella* Bonnier, a genus that came to be characterized according to its only residual species, *Tryphosa barbatipes* Stebbing (1888), for Stebbing (1906) removed all other species Bonnier had assigned to it. This violated Bonnier's intent for he

clearly indicated that *Tryphosella* was a name proposed to replace the "tryphosa" concept of Sars. I, therefore, select *Tryphosella sarsi* Bonnier (1893) as type-species of *Tryphosella* and assign all "tryphosas" except *Anonyx nanus* Krøyer to *Tryphosella*. This negates my (1962a) synonymization of *Tryphosella* with *Uristes* even though *T. barbatipes* is still removed to *Uristes*. It also negates my (1962a) synonymization of *Tmetonyx* Stebbing (1906) with *Tryphosa*, and *Tmetonyx* is revived to include only its type-species *Oniscus cicada* O. Fabricius. That genus differs from *Tryphosella* (="*Tryphosa*" auct.) in the normally quadrate coxa 1.

Orchomene pinguis (Boeck)

FIGURES 25, 26

Anonyx pinguis Boeck, 1861, pp. 642–643.

Orchomene pinguis.—Boeck, 1876, pp. 176–177, pl. 5, fig. 1.—J. L. Barnard, 1964a, p. 90, fig. 21 E-M.

Orchomenella pinguis.—Sars 1895, pp. 67–68, pl. 24, fig. 2—Stebbing, 1906, p. 82.—Gurjanova, 1962, pp. 165–167, figs. 48, 49.

[More than 30 other references with records of this species are not cited.]

MATERIAL.—USNM Acc. No. 247045, Santa Monica Bay, Calif., hagfish trap, 183 m (180 specimens).

Female specimens from a trap in 183 m in Santa Monica Bay have been compared minutely with female specimens from Woods Hole, Mass. collected in 1878 (deposited in Smithsonian Institution). Similarities and differences are listed in two paragraphs to follow.

SIMILARITIES.—Antenna 1 has several short lateral setae on the ventrodistal margin of article 1 of antenna 1; coxae are all similar in shape; pleonal epimera 3 are generally similar; mandibles, lower lips, maxillae 1 and 2 and maxillipeds are very similar even as to spines and their shapes, with small exceptions noted below; article 6 of gnathopod 1 similar; uropods 1–3 and telson; hump of pleonite 4; article 5 of antenna 2 shorter than article 4.

DIFFERENCES.—All of the specimens from the California trap are either ovigerous females, females with oostegites or juveniles having the appearance of normal females; however, most of the adult ovigerous females, except for that one figured herein have second antennae with flagella commencing a male-like elongation through articular proliferation; lateral cephalic lobes of the Californian population slightly narrower than those from Woods Hole; eyes extremely enlarged, irregularly flask shaped, ommatidea extremely numerous and compacted; anterior epistomal margin longer and flatter, lobe of upper lip relatively smaller; triturating surface of mandibular molar slightly weaker; posterior lobe of article 5 of gnathopod 1 broader; article 6 of

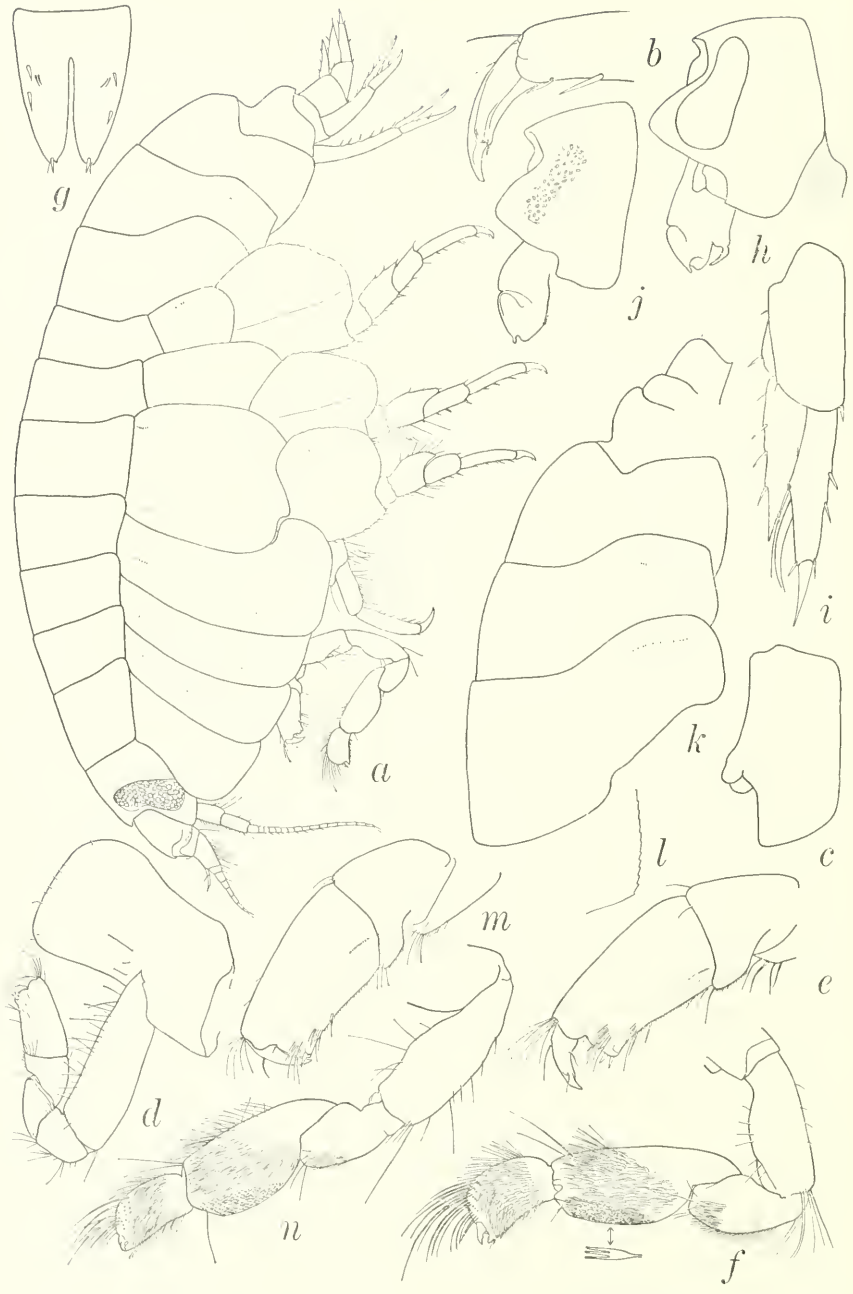


FIGURE 25.—*Orchomene pinguis* (Boeck), female, 5.6 mm, Santa Monica Bay, California, 183 m: *a*, lateral aspect; *b*, apex of pereopod 1; *c*, coxa 6; *d,e*, gnathopod 1, medial and lateral views; *f*, gnathopod 2, medial. Female, 5.0 mm, Santa Monica Bay: *g*, telson; *h*, head and prebuccal complex; *i*, uropod 3. Female, 6.8 mm, Woods Hole, Mass., 1875: *j*, head and prebuccal complex; *k*, pleon, left side; *l*, serrations of pleonal epimeron 2; *m*, gnathopod 1, lateral aspect; *n*, gnathopod 2, medial aspect.

gnathopod 2 much broader, more falconiform; pereopods 3–5 slightly longer and more slender and pereopod 3 lacking lateral ridge on article 2; pleonal epimeron 2 similar but ventral margin slightly more concave.

Relationships.—The similarities of the two populations in terms of general shapes and armaments are striking. For instance, the spines on the outer plate of maxilla 1 are similar, even though complex; the armaments and shapes of uropod 3 are similar. I have figured the

Figure 26.—*Orchomene pinguis* (Boeck), female, 5.0 mm, Santa Monica Bay, Calif., 183 m: *a*, apex of right mandible; *b*, inner plate of maxilliped; *c*, outer plate of maxilla 1; *d*, maxilla 1; *e*, mandibular palp. Female, 6.8 mm, Woods Hole, Mass., 1875: *f–h*, pereopods 3,4,5. Female, 5.6 mm, Santa Monica Bay: *i*, maxilla 2; *j*, maxilliped, inner plate unflattened and setae removed; *k*, mandible, palpar setae removed. Female, 5.4 mm, Santa Monica Bay: *l*, lower lip.

parts from the Californian population and those of the Woods Hole population only where they differ. The posterior edges of the pleonal epimera are minutely but distinctly serrate in specimens from Woods Hole, but the serrations on Californian specimens are extremely weak, especially those on epimeron 3. In both populations the second article of the outer ramus of uropod 3 is longer and more attenuated than that shown by Sars (1895, pl. 24, fig. 2).

Coxa 6 was inadequately represented by Sars but is correctly shown by Gurjanova (1962) for populations from the northwestern Pacific

Ocean. The shape of coxa 6 is a remarkable characteristic of *O. pinguis*. The condition of coxa 6 is known in many other species of *Orchomene* (=*Orchomenopsis* Sars, *Orchomenella* Sars, *?Allogaussia* Schellenberg) but so far only *O. minuta* (Krøyer) has been shown to have a shape almost precisely similar to that of *O. pinguis* (see Gurjanova, 1962, fig. 41).

Orchomene minuta differs from *O. pinguis* in the stronger lobation of the epistome and the unexpanded coxa 1.

The question arises as to whether the Californian population should be distinguished nomenclaturally from that of Woods Hole; indeed, one wonders whether that from Woods Hole differs minutely from that of the eastern Atlantic. The genus is very diverse and many species are distinguished from one another by weakly developed characters, some of less magnitude than seen in the two populations analyzed here. For instance, Gurjanova (1962) has arranged *O. minuta*, *O. lepidula* (new species), *O. intermedia* (new species), *O. minuscula* (new species), and *O. pinguis* in consecutive order to demonstrate their close affinities. She shows three varieties of *O. minuta*, two of *O. intermedia* and two of *O. pinguis* besides. These nine species and variants are, in general, distinguished from each other in no more remarkable ways than are the two populations described herein. Table 3 has been composed by utilizing six characters to distinguish the nine "variants" of Gurjanova plus the California and Woods Hole populations. Numerous other characters could be so treated. One can almost imagine an infinite variety of potential combinations of characters.

If all known characters are considered the California population stands closest to that of *O. pinguis* figured by Gurjanova except in three gross characters, the broader lobe of article 5 on gnathopod 1, the larger eyes (?) and the enlarged and falconiform article 6 of gnathopod 2. Gnathopod 1 and eyes of Californian specimens resemble those of *O. minuscula* but coxa 6 of that species is only weakly elongated and the posterior lobe weakly quadrate. Coxa 4 of *O. minuscula* has a broader posterior lobe. The Californian specimens are clearly different from *O. minuta* in epistome, coxa 1, and gnathopod 2; from one population of *O. minuta* in epimeron 2 but not gnathopod 2; and from another population in gnathopod 2 but not gnathopod 1. Coxa 6 and epistome are clearly distinct in *O. lepidula*. *Orchomene intermedia* is truly what its name suggests, because coxa 6 is almost fully like that of *O. pinguis*, gnathopod 1 is intermediate between that of *O. minuscula* and *O. pinguis*, the epistome is only moderately lobate, the cephalic lobes are very sharp, eyes are apparently large, and coxa 5 has an enlarged posterior lobe. In summary the Californian speci-

mens combine the following characters: coxa 6 of *minuta* and *pinguis*, gnathopod 1 (not counting the coxa) of some forms of *minuta*, *lepidula*, *minuscula*, epistome of *pinguis* (but with slight modification), coxa 1 of *pinguis*, *minuscula*, *intermedia;* epimeron 3 of *pinguis*, *lepidula*, *minuscula;* eyes of *minuscula* (?), uropod 3 of *pinguis* (but apparently no others if drawn correctly) and gnathopod 2 of one form of *O. minuta.*

TABLE 3.—Variation in six characters of 11 forms of 5 closely related species of *Orchomene* (Symbols: +=yes; 0=no; +0, 0+=intermediate conditions; ?=questionable).

Species names	Coxa 1 distally expanded	Epistome lobate	Coxa 6 with perfectly quadrate and extended posteroventral lobe	Posteroventral corner of epimeron 2 sharp or produced	Lobe of article 5 of gnathopod 1 slender	Lobe of article 5 of gnathopod 2 rounded posteriorly
minuta [Gurjanova, 1962, fig. 41]	0	+	+	0	+0	+
minuta [Gurjanova, 1962, fig. 42]	+0	+	0+	+	+0	+
minuta [Gurjanova, 1962, fig. 43]	+0	?	?	?	+0	0
lepidula Gurjanova, 1962, fig. 44	0	+	0	?	+0	+
intermedia Gurjanova, 1962, fig. 45	0+	+0	+0	?	+0	+
intermedia Gurjanova, 1962, fig. 46	+	+	+0	?	+0	+
minuscula Gurjanova, 1962, fig. 47	+0	0+	+0	?	+	?
pinguis [Gurjanova, 1962, fig. 48]	+	0+	+	?	+	+
pinguis [Gurjanova, 1962, fig. 49]	+	0+	+	?	+	+
pinguis [Woods Hole, Mass.]	+	0+	+	0	+	+
pinguis [Santa Monica Bay, Calif.]	+	0	+	0	0	+

In two characters, the Californian population resembles that from Norway (Sars, 1895) more than it does that from Woods Hole. These characters are the elongated pereopods 3–5 and the form of the prebuccal structure.

Two collections of *O. pinguis* from the northwestern Pacific illustrated by Gurjanova (1962) differ from each other, from Sars' drawings and from Woods Hole specimens. Both of Gurjanova's illustrated specimens are females but uropod 3 differs strikingly, one of them being more spinose and with a slightly longer inner ramus than the other. One of the sixth coxal lobes is sharply quadrate, the other

softly rounded. The prebuccal portions are like those of Woods Hole specimens and not those of Sars or California. Pereopod 3 is stouter in one of Gurjanova's specimens than in the other. There are small differences in the shapes of article 2 of pereopods 3–5 in all populations discussed herein.

These slim bits of evidence indicate that *Orchomene pinguis* is composed of a large number of geographic races and perhaps ecophenotypes. The complex of forms probably includes *O. minuscula* (Gurjanova, 1962), which differs from all others by the broader posterior lobe of coxa 4. *Orchomene minuta* differs from *O. pinguis* in the conspicuous, convexly produced epistome and unexpanded coxa 1. The Sakhalin form of *O. minuta* partially figured by Gurjanova (1962) differs from "typical" *O. minuta* in the slightly expanded coxa 1 and the slender article 5 of gnathopod 2 and may have to be removed to some other nomenclatural status. *Orchomene intermedia* Gurjanova (1962) is the perfect intergrade between *O. pinguis* and *O. minuta* because it combines the expanded coxa 1 with a produced epistome. It may be a hybrid between the two species.

Sympatric relationships.—Seven other species of *Orchomene* occur in California, not including *Allogaussia recondita* Stasek, which has been assigned provisionally to *Orchomene* but which has an uncleft telson. *Orchomene pinguis* differs from all of those species in the extreme elongation and quadrate posterior lobation of coxa 6. The other Californian orchomenes are *O. decipiens* Hurley (1963), *O. holmesi* Hurley (1963), *O. anaquela* J. L. Barnard (1964a), *O. pacifica* (Gurjanova) (see J. L. Barnard, 1964a), *O. magdalenensis* Shoemaker (1942), *O. obtusa* (Sars) (=*O. affinis* Holmes, 1908, see J. L. Barnard, 1964a), and *O. tabasco*, new species. The juveniles of *Pseudokoroga rima* J. L. Barnard (1964a) superficially resemble *O. pinguis* but coxa 6 of the latter is characteristic.

The following diagnosis of *O. pinguis* is based on all forms so far recorded, including that from California. The extent and complexity of the diagnosis are indicative of the large number of species in *Orchomene* and the numerous characters of small and quantitative extent which have been used to distinguish the species.

Diagnosis of *Orchomene pinguis*.—Lateral cephalic lobes strongly projecting, dorsal and ventral oblique margins forming angle of less than 90°, apex appearing grossly subacute but minutely rounded; eyes present; article 5 of antenna 2 much shorter than article 4; epistomal margin ending flush with lobe of upper lip, straight or very slightly convex; article 1 of mandibular palp shorter than article 3; some spines of outer lobe of maxilla 1 disjunct; coxa 1 distally expanded, coxa 5 with subconical posterior lobe projecting below antero-

ventral coxal margin; coxa 6 longer than broad, with long quadrate or subquadrate posterior lobe; hand of gnathopod 1 weakly tapering distally, article 5 much shorter than 6, posterior lobe narrow or of medium width, dactyl fitting palm; article 5 of gnathopod 2 tumid, with strongly and symmetrically rounded posterior margin; article 6 with slightly chelate palm lacking extraordinary complex processes; distal spine pair of article 6 on all pereopods of regular form, slightly sabre shaped but not enlarged or highly modified; second articles of pereopods 3–5 broadly expanded, posteroventral lobes weakly extended, posterior margins minutely serrate; posteroventral corner of pleonal epimeron 1 rounded, of epimeron 2 subrounded or very weakly subquadate, of epimeron 3 weakly quadrate, angle obtuse, posterior edges of epimera minutely serrate; pleonite 4 with long, rounded dorsal hump; uropods 1 and 2 with both rami spinose; inner ramus of uropod 3 not exceeding base of article 2 of outer ramus; telson cleft about two thirds of its length.

Distribution.—This species has been recorded from such widely dispersed localities that it is presumed to live throughout the northern cold-temperate and subarctic seas. The present record is the most southerly yet published, except that made by Barnard (1964a) from Laguna Beach, a few miles south of Santa Monica Bay. The specimen from Laguna Beach has a head and prebuccal structures more similar to those of Woods Hole populations than do specimens from the trap in Santa Monica Bay.

The abundance of this species in the trap sample and its extreme rarity in benthic grab samples suggests that the species in California is epibenthic or demersal and thus escapes grab devices. Only the one specimen from a depth of 64 meters at Laguna Beach was caught in over 500 grab samples in depths of 10 to 183 meters. Hurley (1963) did not find the species in the extensive Hancock collections of Californian benthos either; however, depths exceeding 200 meters have not been adequately sampled, although J. L. Barnard (1966a) did not find the species in several hundred samples from canyons and basins in depths between 200 and 2000 meters. In summary, this species is now recorded from southern California, in depths between 64 and 183 meters.

Orchomene tabasco, new species

Figures 27, 28

Diagnosis.—Lateral cephalic lobes of medium width, subacute; eyes absent; article 5 of antenna 2 shorter than article 4; epistome broadly rounded anteriorly and projecting in front of upper lip; epistome flatter in juvenile than in adult; palp article 1 of mandible shorter than article 3; some spines of outer plate of maxilla 1 disjunct; coxa 1

scarcely expanded, beveled anteriorly, coxa 4 with posteroventral lobe narrow, evenly subrounded posteriorly, slightly deeper (dorsoventrally) and more quadrate in juvenile than in adult; coxa 6 with subquadrate, medium-sized posteroventral lobe; articles 5 and 6 of gnathopod 1 equal to each other in length, posterior lobe of article 5 broadly truncated, distally produced as small lobule, better developed in juvenile than in adult; article 6 not tapering distally; article 5 of gnathopod 2 very stout and short, posterior edge hemispherical, article 6

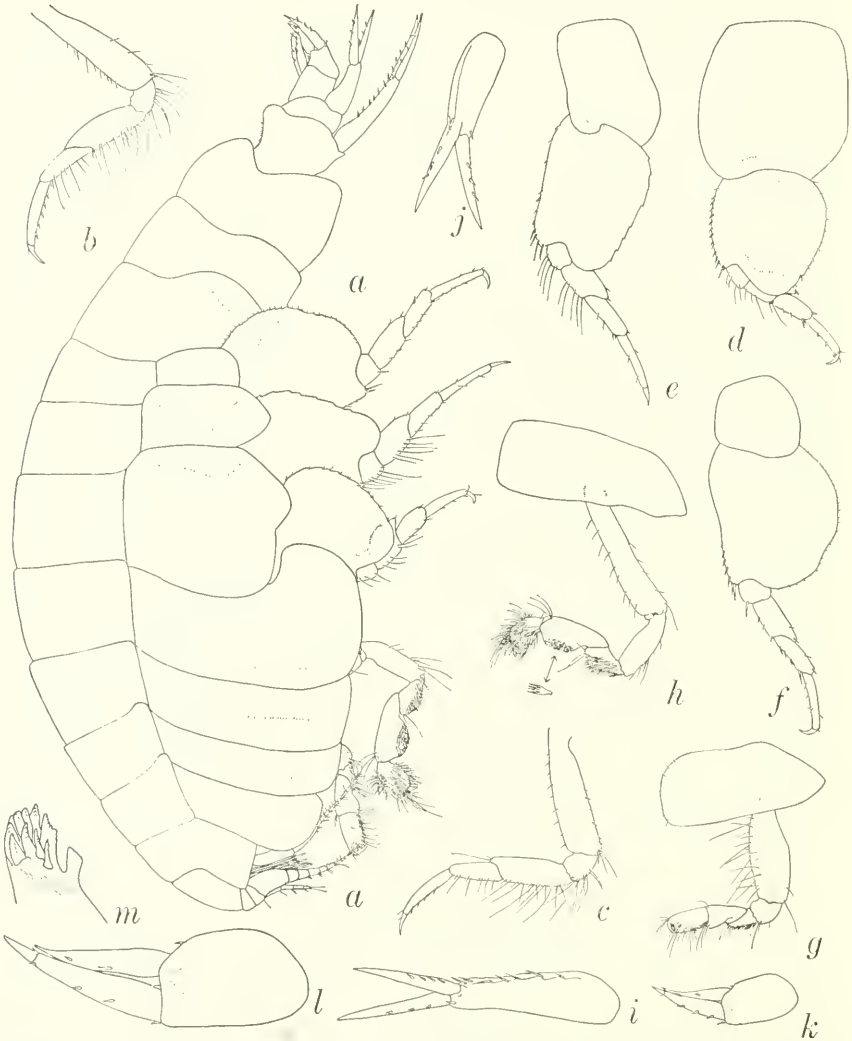


FIGURE 27.—*Orchomene tabasco*, new species, holotype, female, 7.0 mm, 7229: *a*, lateral aspect; *b–f*, pereopods 1,2,3,4,5; *g,h*, gnathopods 1,2; *i–l*, uropods 1,2,3 (3 enlarged); *m*, outer lobe of maxilla 1.

tapering proximally, palm acutely chelate, lacking extraordinary complex processes; posterodistal spines on article 6 of pereopods 1 and 2 simple; pereopod 3 with subcircular article 2, posterior lobe extending nearly to middle of article 4, latter slightly thickened; article 2 of pereopod 5 very broad, slightly excavated posterodistally (not damaged); posteroventral corners of pleonal epimera as follows: 1 rounded, 2 subquadrate, 3 rounded-quadrate, and 3 with slightly convex, smooth posterior margin; pleonite 4 with dorsal hump in adult female, nearly straight dorsally in juvenile; uropods 1 and 2 with both rami spinose; inner ramus of uropod 3 reaching apex of outer ramus; telson cleft 40 percent of its length, each apex with one large spine.

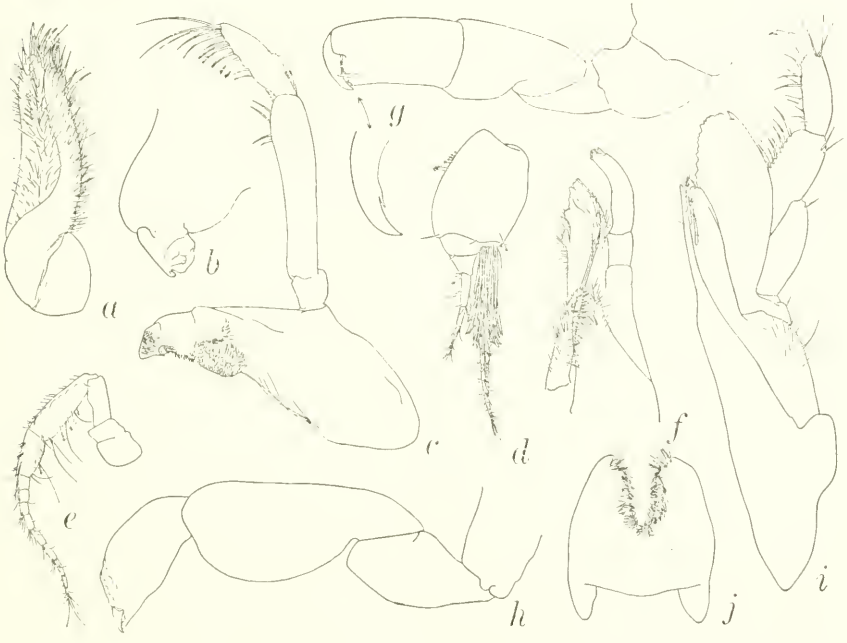


FIGURE 28.—*Orchomene tabasco*, new species, holotype, female, 7.0 mm, 7229: *a*, maxilla 1; *b*, epistome-labrum complex, left lateral; *c*, mandible; *d,e*, antennae 1,2; *f*, maxilla 1; *g,h*, gnathopods 1,2, minus setae; *i*, maxilliped; *j*, lower lip.

HOLOTYPE.—AHF No. 6032, female, 7.0 mm.

TYPE-LOCALITY.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

MATERIAL.—Holotype and one juvenile, 2.4 mm long, from the type-locality.

RELATIONSHIP.—This species fits into the complex of species surrounding *Orchomene pinguis* (Boeck), just discussed above. The congruency is seen in the condition of the following characters: lateral

cephalic lobes, shortness of article 5 of antenna 2, shape of epistome, conditions of gnathopods, coxa 6, pleonal epimera and pleonite 4. *Orchomene tabasco* differs from all five members of the complex in the shorter cleft of the telson (40% as compared to 50+%) and the absence of eyes. It further differs from *O. minuta* in the slight expansion of coxa 1, from *O. lepidula* in coxa 1 and the shorter inner ramus of uropod 3, from *O. intermedia* in the smaller posterior lobe of coxa 5, from most forms of *O. pinguis* in the broader lobe on article 5 of gnathopod 1 but differs in no other gross characters from *O. minuscula* than those mentioned above for all five species.

Sympatric relationships.—*Orchomene tabasco* resembles *Orchomene holmesi* (Hurley, 1963) especially in its gnathopods, pleonal epimera and pereopods, but differs by the protrusion of the epistome anterior to the upper lip, the narrower cephalic lobes, the presence of a posteroventral lobe on coxa 6, the shape of article 2 on pereopod 5 and the longer fifth article of gnathopod 1. *Orchomene anaquela* J. L. Barnard (1964a) bears eyes, a poorly produced coxa 6 and a narrower article 2 of pereopod 5. The fourth coxa of the juvenile of *O. tabasco* is like that of *O. anaquela*, the posteroventral lobe being more quadrate than in the adult of *O. tabasco*. *Orchomene anaquela* occurs on the Californian coastal shelf in a depth of 33 meters.

There is a strong resemblance of *O. tabasco* to *Uristes dawsoni* Hurley (1963). Although *U. dawsoni* is justifiably placed in *Uristes* because of its small head, the slight anteroventral bevelment of coxa 1 and the position of the mandibular palp, *U. dawsoni* might better be placed in the genus *Orchomene*. Species of *Uristes* generally have the posteroventral corner of coxa 1 beveled, the mandibular molar setulose and the mandibular palp occurring directly opposite the molar. Even if the type-species, *U. gigas* (Dana) (auct.=*Tryphosa antennipotens* Stebbing, 1888), has a poorly beveled posteroventral corner of coxa 1, the other characters are congruent. Indeed, *U. dawsoni* is an intergrade between *Uristes* and *Orchomene*. The resemblance of *O. tabasco* to *U. dawsoni* occurs in the prebuccal complex and pleonal epimera; the head of *U. dawsoni* is only slightly narrower than it is in *O. tabasco*, the mandibular palp is only slightly more proximally located, the fifth article of gnathopod 1 is scarcely shorter, the hand of gnathopod 2 is only slightly stouter and less strongly chelate, article 2 of pereopod 5 is only slightly less broad and more symmetrically expanded, the accessory flagellum is somewhat shorter, and the spines on the medial edge of the outer plate of the maxilliped are more distinct.

Prachynella J. L. Barnard

Prachynella lodo J. L. Barnard

FIGURES 29, 30

Prachynella lodo J. L. Barnard, 1964c, pp. 233–234, fig. 7; 1966a, p. 70.

This nearly blind specimen, 3.4 mm long, resembles the oculate shallow-water form described by Barnard (1964c) from the coastal shelf of southern California and Baja California in all characters

FIGURE 29.—*Prachynella lodo* J. L. Barnard, oculate form, female, 6.2 mm, southern California coastal shelf: *a*, lateral view; *b,c*, antennae 1,2; *d*, mandible; *e*, lower lip; *f,g*, maxillae 1,2; *h*, maxilliped; *i*, maxillipedal palp; *j,k*, gnathopod 1; *l*, gnathopod 2; *m–o*, pereopods 3,4,5; *p–r*, uropods 1,2,3; *s*, telson.

except for the conspicuous absence of the shallow posterodorsal tooth and the posterolateral sinuation of the margin of pereonite 5. In this character the specimen resembles *Pachynus barnardi* Hurley (1963). The original figures of *P. lodo* are reprinted here, owing to their poor

FIGURE 30.—*Prachynella lodo* J. L. Barnard, anoculate form, male, 3.4 mm, 7234: *a,b*, medial and lateral views of first gnathopodal hand; *c,d*, maxilla 1; *e*, hand of gnathopod 2; *f,g*, medial and lateral views of right and left gnathopod 2, apices of hands showing dactyls. Oculate form, size and sex unknown, coastal shelf of southern California: *h*, maxilla 1; *i–k*, pereopods 3,4,5.

original printing; the eye of the shallow-water form, eliminated in the original engraving, is correctly printed now. Included are several figures of a weakly chitinized specimen from shallow water, which are contrasted with the deep-sea blind form in the presence of a molar-like, embedded spine at the defining corner of the palm of gnathopod 1 and the minute accessory spines on the outer lobe of maxilla 1. A slight hump on the lateral margin of maxilla 1, which may represent the vestigial palp, has been discovered in both deep-water and shallow-water forms. The shapes of gnathopod 2 differ somewhat between the two forms. The anoculate form has vestigial purple pigment in place of ommatidial eyes.

Material.—Station 7234 (1).

Distribution.—Monterey Bay, Calif., to Bahía San Cristóbal, Baja California, oculate form in depths of 10–439 m, anoculate form in 791 m.

Schisturella Norman, new synonymy

Schisturella Norman, 1900, p. 208.
Pseudonesimus Chevreux, 1926, p. 3.

Diagnosis.—Upper lip and epistomal complex conspicuous, large, upper lip strongly lobate and anteriorly produced in type-species but poorly lobed and unproduced in other species; head rather small (subjective relationship, see comments, p. 39); mouthparts not especially concealed by coxae and quadrately grouped from lateral aspect; mandibular molar strong, with grinding ridges poorly developed or nearly absent, palp attached level with molar; maxilla 1 with several stout spines on outer lobe; other mouthparts typical of nonaberrant lysianassids; coxa 1 reduced in size slightly, narrowed, tapering, partially hidden by coxa 2; gnathopod 1 subchelate, not enlarged; inner ramus of uropod 2 strongly constricted toward distal end; outer ramus of uropod 3 biarticulate; telson longer than broad, cleft varying from 33 to 75 percent of total length of telson.

Type-species.—*Tryphosa pulchra* Hansen (see Shoemaker, 1930).

Generic composition.—*Pseudonesimus abyssi* Chevreux (1926). *P. abyssi tasmanensis* J. L. Barnard (1961), *Lakota adversicola* K. H. Barnard (1925) (as *Chironesimus* in Schellenberg, 1926b, and J. L. Barnard, 1962a), *Schisturella grabenis*, new species, *S. totorami*, new species, *Ambasiopsis robustus* J. L. Barnard (1961), *Lakota rotundatus* K. H. Barnard (1925) (as *Chironesimus* in J. L. Barnard, 1962a), *Schisturella cocula* and *S. zopa* J. L. Barnard (1966a).

Remarks.—J. L. Barnard (1966a) pointed out that species he had assigned to *Schisturella* have a subconical process on the posterodistal margin of article 3 of antenna 2; this is now shown to be characteristic

of both males and females of at least one species, *S. totorami*, new species. The lateral surface of article 3 has the process at the posterodistal corner and the medial surface has the process on the mid-distal margin.

Male third uropods apparently are more setose than those of females and in *S. zopa* the third pleonal epimera differ slightly between the two sexes.

Key to the Species of *Schisturella*

1. Pleonal epimeron 3 with posteroventral tooth distinctly separated from body of epimeron 2
   Pleonal epimeron 3 lacking posteroventral tooth but occasionally posteroventral corner sharp or slightly attenuated 5
2. Palm of gnathopod 1 very oblique, obsolescent 4
   Palm of gnathopod 1 transverse or slightly oblique, fully evident 3
3. Palm of gnathopod 1 perfectly transverse; pleonal epimeron 2 rounded-quadrate posterodistally; epimeron 1 with adze-shaped anterior extension, no tooth . . . . . **S. zopa** J. L. Barnard
   Palm of gnathopod 1 oblique; pleonal epimeron 2 with protruding posterodistal subacute angle; epimeron 1 not adze shaped, with strong anteroventral hook . . . . . **S. totorami,** new species
4. Eyes absent . . . . . **S. grabensis,** new species
   Eyes present . . . . . **S. cocula** J. L. Barnard
5. Upper lip with large anterior lobe strongly projecting in front of epistome . 6
   Upper lip scarcely lobate, nearly flush with epistome . . **S. abyssi** (Chevreux)
6. Eyes present, palm of gnathopod obsolescent, extremely oblique. **S. pulchra** Hansen
   Eyes absent, palm of gnathopod 1 present and transverse 7
7. Telson cleft one third its length . . . . . **S. adversicola** (K. H. Barnard)
   Telson cleft one half its length 8
8. Coxa 1 hemi-oval . . . . . **S. robusta robusta** (J. L. Barnard) **S. robusta cedrosiana,** new subspecies
   Coxa 1 subconical, anteroventrally extended . . **S. rotundata** (K. H. Barnard)

Schisturella abyssi (Chevreux), new combination

FIGURES 31, 32

Pseudonesimus abyssi Chevreux, 1926, pp. 3–5, fig. 2

DESCRIPTION OF MATERIAL AT HAND.—Lateral cephalic lobe symmetrically mammilliform, blunt apically; eyes absent; epistome deep, slightly convex, labral process small, rounded, slightly projecting; mandibular molar small, densely ridged, bearing digressive setulose ridge; lower lip with slightly excavate anterior margins; coxa 1 about 60 percent as long as coxa 2, anterior and posterior edges parallel, ventral margin symmetrically rounded, article 2 of gnathopod 1 about 1.3 times as long as coxa 1; coxae 2–4 neither strongly overlapping nor grossly unequal in length; article 6 of gnathopod 1 longer than article 5, palm slightly oblique and slightly S-shaped, dactyl with small acces-

sory tooth and 2 accessory setules, article 5 poorly lobate posteriorly but with small posterodistal, acute process; gnathopod 2 slender, unusually short, hand of medium breadth, rectangular, palm transverse or forming slight blunt chela, dactyl large, fitting palm, inserted mediodistally on article 6; pereopods 1–5 generally without specific diagnostic features, pereopods 1 and 2 lacking distinctive posterodistal spines on sixth articles, pereopods 3–5 broken at fifth articles; pleonal epimeron 1 with quadrate anteroventral corner, posterior corner rounded, epimera 2 and 3 with quadrate posteroventral corners; dorsal process of pleonite 4 low, humped; inner ramus of uropod 2 with deep incision; telson cleft slightly less than halfway, lateral margins bearing spines.

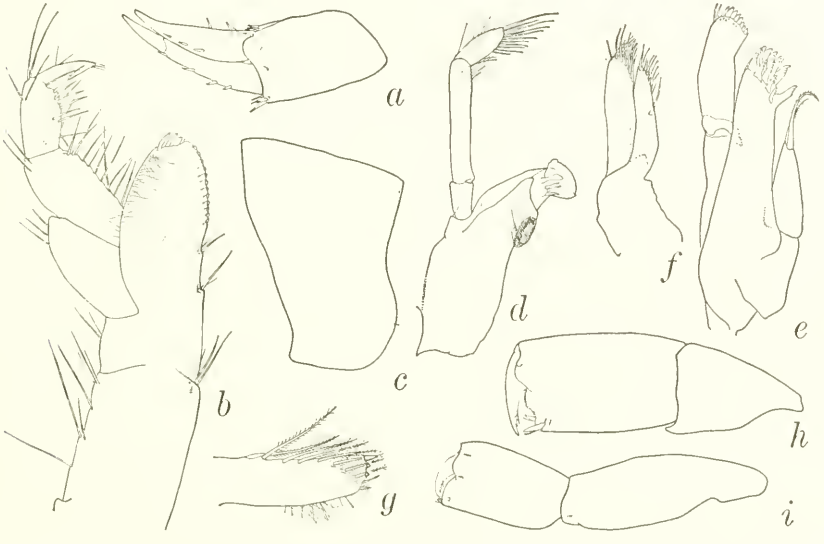


FIGURE 31.—*Schisturella abyssi* (Chevreux), female, 5.9 mm, 7230: *a*, uropod 3; *b*, maxilliped, ventral surface, inner plate hidden and not outlined; *c*, pleonal epimeron 1, left lateral; *d*, mandible; *e,f*, maxillae 1,2; *g*, inner plate of maxilliped; *h,i*, distal ends of gnathopods 1,2, minus setae.

MATERIAL.—Station 7230, female, 5.9 mm.

REMARKS.—The characters of this specimen resemble those of *Schisturella a. abyssi* much more closely than do those of *S. abyssi tasmanensis* (J. L. Barnard, 1961). The small differences of this specimen from that described by Chevreux are: the blunter, more truncated posteroventral corner of the third pleonal epimeron, the shorter posteroventral lobe of article 2 on pereopod 3, the very slightly deeper telsonic cleft, and the slightly broader lateral cephalic lobe. *Schisturella a. abyssi* differs from its congeners by the poor development of the labral lobe.

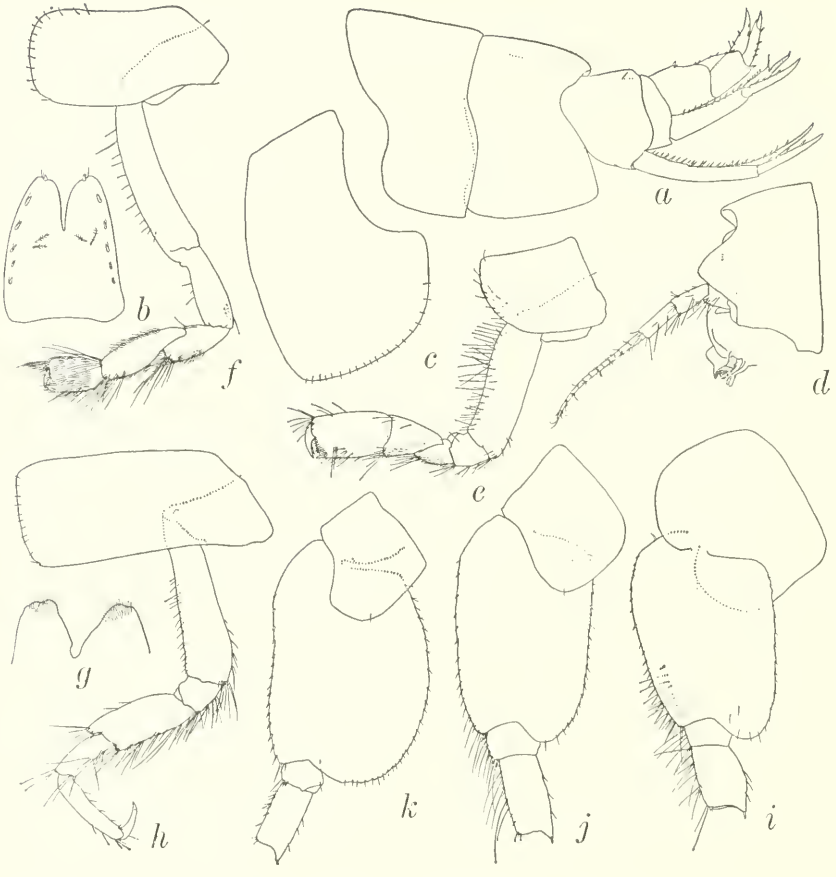


FIGURE 32.—*Schisturella abyssi* (Chevreux), female, 5.9 mm, 7230: *a*, pleonites 2–6; *b*, telson; *c*, coxa 4; *d*, head and antenna 2; *e,f*, gnathopods 1,2; *g*, apices of lower lip; *h–k*, pereopods 1,3,4,5.

Schisturella grabenis, new species

FIGURES 33, 34

DIAGNOSIS.—Lateral cephalic lobes moderately broad, narrowly rounded but not acute; eyes absent; epistome of medium depth, flat, process of upper lip long, slender, projecting strongly in front of epistome; mandibular molar small, scarcely ridged; lower lip with blunt apices; coxa 1 about 67 percent as long as coxa 2, thus coxa 1 long for the genus, anterodistal bevelment strongly curved, posterior edge becoming oblique ventrally, thus coxa generally tapering distally, article 2 of gnathopod 1 very slightly longer than coxa 1, article 6 shorter than 5, slender, palm very oblique and scarcely distinct in slope from posterior margin but strongly defined by large spines, dactyl with

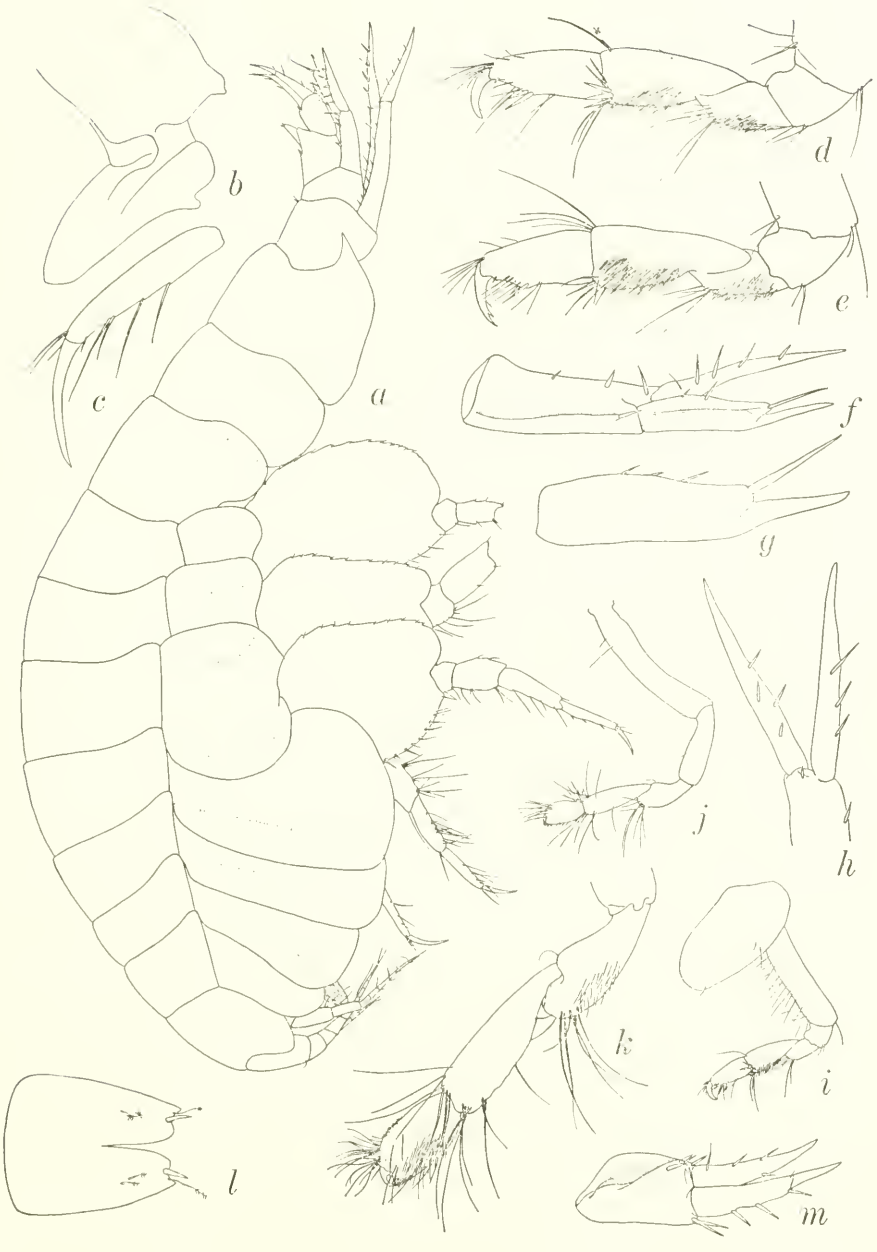


FIGURE 33.—*Schisturella grabenis*, new species, holotype, female, 5.0 mm, 7229: *a*, lateral aspect; *b*, labrum projecting below flat epistome; *c*, articles 6,7 of pereopod 2; *d,e*, medial and lateral views of gnathopod 1; *f*, uropod 2; *g*, inner ramus of uropod 2; *h*, rami of uropod 1; *i,j*, gnathopods 1,2 (same magnification as whole-view); *k*, gnathopod 2, enlarged; *l*, telson; *m*, uropod 3.

small accessory tooth and setule, article 5 truncate posteriorly, unlobed; gnathopod 2 slender but not shortened, hand narrow, rectangular, palm forming slight finger, dactyl of medium size, fitting palm, inserted mediodistally on article 6; pereopods 1 and 2 lacking distinctive posterodistal spine on article 6, pereopods 3–5 without special diagnostic features, and 4 and 5 broken at fifth articles; pleonal epimeron 1 with rounded anteroventral corner, posterior corner rounded-quadrate, epimeron 2 with subquadrate posterior corner, epimeron 3 with large posterior plate terminating in obliquely and dorsally directed tooth below which posterior margin distinct from ventral margin; dorsum of pleonite 4 straight, bearing two setae; inner ramus of uropod 2 with deep constriction; telson cleft slightly less than halfway.

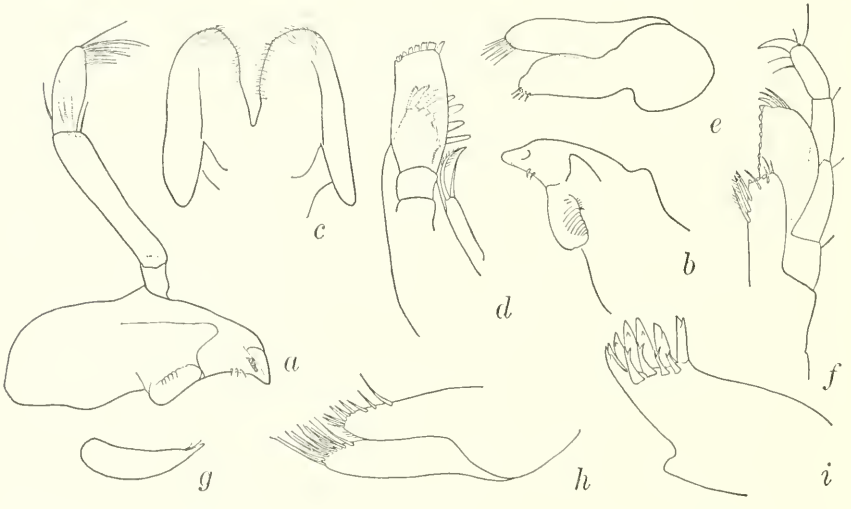


Figure 34.—*Schisturella grabenis*, new species, male, 5.0 mm, 7229: *a,b*, mandibles; *c*, lower lip; *d*, maxilla 1; *e*, aberrant right maxilla 2, *f*, maxilliped; *g*, palp article 4 of maxilliped; *h*, normal left maxilla 2; *i*, outer lobe of maxilla 1.

Holotype.—AHF No. 6021, female, 5.0 mm.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Material.—Sixteen specimens from the type-locality.

Remarks.—Gills of pereopods 3 and 4 have a small accessory lobe; the gill of pereopod 5 is very small.

Relationship.—This species comes closest to *Schisturella adversicola* (K. H. Barnard, 1925) from the south Atlantic Ocean but differs by the longer, thinner lobe of the upper lip, by the larger tooth of the third pleonal epimeron, the slightly deeper cleft of the telson and

by the somewhat blunter lateral cephalic lobes. The first gnathopod is weakest in development of any *Schisturella* except the type-species and the third pleonal epimeron tooth is the largest.

***Schisturella robusta cedrosiana*, new subspecies**

FIGURE 35

DIAGNOSIS.—Differing from the typical subspecies, *S. r. robusta* (J. L. Barnard, 1961) by the sharper lateral cephalic lobe and the

FIGURE 35.—*Schisturella robusta cedrosiana*, new subspecies, holotype, male, 6.8 mm, 7229: *a*, lateral aspect; *b*, pereopod 1; *c*, leftward projecting labrum below flat epistome; *d–f* gnathopod 1; *g–i*, gnathopod 2; *j*, antenna 1; *k*, telson; *l*, uropod 1; *m*, uropod 2; *n*, inner ramus of uropod 2; *o*, uropod 3.

obliquely truncated posteroventral margin of the third pleonal epimeron.

Holotype.—AHF No. 6028, male, 6.8 mm. Unique.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Remarks.—The differences between the two subspecies are of much less magnitude than between full species of the genus. The typical subspecies was recorded from the Tasman Sea in a depth of 3580 m.

Schisturella totorami, new species

Figures 36, 37

Diagnosis.—Lateral cephalic lobes narrow, subacute apically; eyes absent; epistome of medium depth, flat, labral process of medium length, projecting strongly in front of epistome; mandibular molar strongly projecting, almost conical, setulose but with small triturate area, better developed on left molar than on right; lower lip with blunt setulose apices; coxa 1 about 67 percent as long as coxa 2, thus coxa 1 long for the genus, subconical, anteriorly concave; article 2 of gnathopod 1 slightly longer than coxa 1, article 6 shorter than 5, slender, palm slightly oblique, tending to be transverse, dactyl with small accessory tooth and setule, article 5 truncate posteriorly, unlobed; gnathopod 2 slender but not shortened, hand moderately expanded, rectangular, palm forming slight chela, dactyl of medium size, fitting palm, inserted mediodistally on article 6; pereopods 1 and 2 lacking any posterodistal spine near dactyl; pleonal epimeron 1 with large hooked cusp at anteroventral corner in male, not hooked in females and juveniles; posterior corner rounded-quadrate, epimeron 2 with subquadrate but slightly projecting posteroventral corner, epimeron 3 with short, broad posteroventral tooth, longer in female than in male; dorsum of pleonite 4 with hump in male but flat in female; inner ramus of uropod 2 with deep constriction; telson cleft about halfway.

Holotype.—USMN No. 113226, male, 5.9 mm.

Type-locality.—USMN Acc. No. 247045, Santa Monica Bay, Calif., hagfish trap, 183 m (5), Feb. 18–19, 1963, coll. T. R. Folsom.

Relationship.—This species resembles *Schisturella zopa* J. L. Barnard (1966a) from California but differs in the more strongly trapezoidal and anteriorly extended coxa 1, in the presence of a protruding subacute angle on the posteroventral corner of pleonal epimeron 2, the presence of a strong hook on the anteroventral corner of epimeron 1, the weaker tooth of pleonal epimeron 3 and the oblique

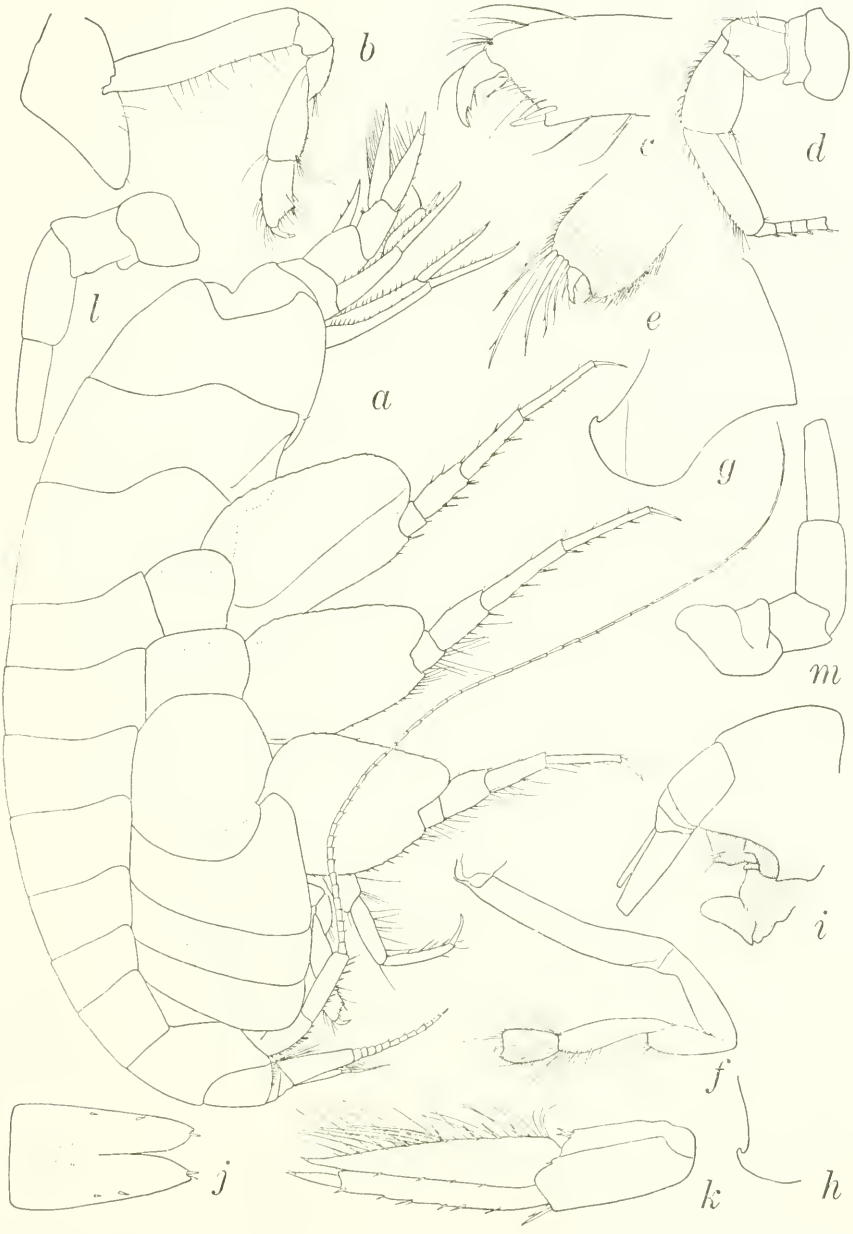


FIGURE 36.—*Schisturella totorami*, new species, male, 5.9 mm, Santa Monica Bay, Calif,. 183 m: *a*, lateral aspect; *b,c*, gnathopod 1, medial; *d*, antenna 2, medial; *e,f*, gnathopod 2, medial; *g,h*, left and right pleonal epimeron 1; *i*, head; *j*, telson; *k*, uropod 3. Female, 5.3 mm: *l,m*, lateral and medial views of peduncle of antenna 2.

palm of gnathopod 1. *Schisturella zopa* has a transverse palm on gnathopod 1 and an adze-shaped anteroventral extension of epimeron 1.

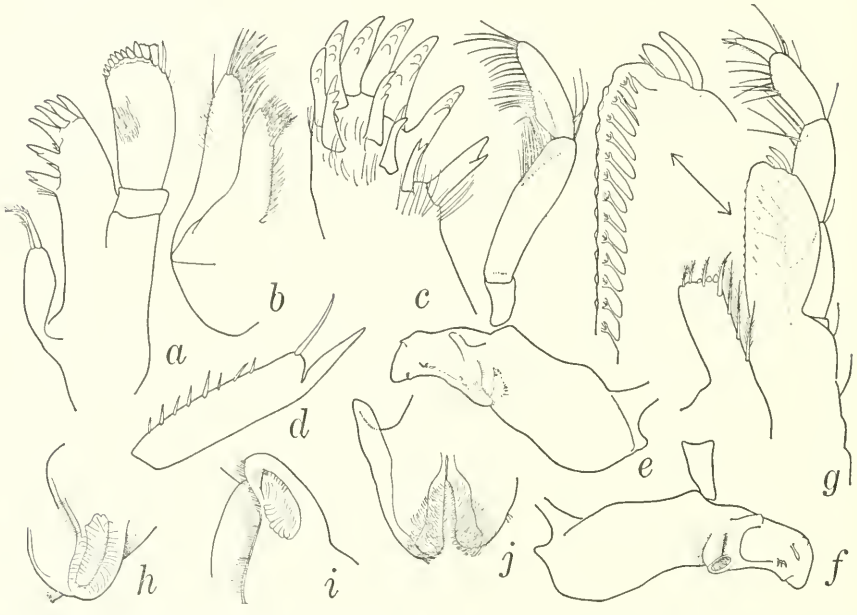


FIGURE 37.—*Schisturella totorami*, new species, male, 5.9 mm, Santa Monica Bay, Calif., 183 m: *a*, maxilla 1, aboral; *b*, maxilla 2; *c*, outer plate of maxilla 1, oral; *d*, inner ramus of uropod 2; *e,f*, mandibles; *g*, maxilliped; *h,i*, left and right mandibular molars; *j*, lower lip (part).

Tmetonyx Stebbing

Tmetonyx Stebbing, 1906, p. 73.

REMARKS.—J. L. Barnard (1962a) synonymized *Tmetonyx* Stebbing with *Tryphosa* Boeck, but the type-species of the latter is synonymous with *Orchomene* even though the remaining species of "*Tryphosa*" are not. In view of the normal first coxa of the type-species of *Tmetonyx*, *Oniscus cicada* O. Fabricius, and the tapering first coxae of other species of *Tmetonyx* and those of "*Tryphosa*" auct., it might have been wiser to remove from *Tmetonyx* all species except the type and assign them to "*Tryphosa*" auct. (=*Tryphosella* Bonnier). Two subgenera within "*Tryphosa*" might have to be established in recognition of the presence or absence of a dactylar tooth on gnathopod 1. In this way one might hypothesize that ancestors like *Tmetonyx cicada* gave rise to members of "*Tryphosa*" through reduction of coxa 1, and that some of these, through loss of the dactylar tooth, gave rise to the members of the second "subgenus" of "*Tryphosa*." The alter-

native nomenclatural solution would be to retain all tmetonyxes in *Tmetonyx* and base the genus on the presence of a dactylar tooth regardless of the condition of the first coxa. This would require the transfer of several species now assigned to "*Tryphosa*" into *Tmetonyx* because of their dactylar teeth. The problem is complicated by the occurrence of several species with intergrading conditions in the size of dactylar teeth and this suggests that the nomenclatural valuation lies at the subgeneric level. The whole tryphosa problem is also complicated by the uncertainty of classification in related genera as discussed in the introduction to the Lysianassidae, under *Ambasiopsis fomes* and *Uristes perspinis* and in the discussion of the relationships of the new "tryphosa" below.

Tryphosella Bonnier (="*Tryphosa*" auct.)

Tryphosella Bonnier, 1893, pp. 170–171.

"*Tryphosa*".—Sars, 1895, pp. 75–76.—Stebbing, 1906, p. 68.—J. L. Barnard, 1962b, pp. 28–29 (not Boeck, 1871; but including all species except the type-species of *Tryphosa*, *Anonyx nanus* Krøyer).

"*Tmetonyx*".—auct. (not Stebbing, 1906, but including all species except type-species, *Oniscus cicada* O. Fabricius).

?*Lepidepecrcopsis* Stephensen, 1925, p. 119.

Type-species.—*Tryphosella sarsi* Bonnier (present selection). This species is identified as "*Tryphosa nana*" of Sars, 1895, p. 76, pl. 27, fig. 1 (not Krøyer).

Diagnosis.—Lysianassid with "large" head, lateral cephalic lobes, normal-sized and noncoalesced thoracic and abdominal segments, fully developed mouthparts and uropods, accessory flagellum multiarticulate; mouthparts grouped in quadrate bundle below head; prebuccal parts strongly developed, epistome protuberant and dominating small lobe of upper lip, occasionally epistome subacutely produced; mandibular incisor medially smooth, molar of medium size or small, not cuboidal, asymmetrical, occasionally slightly attenuated but never conico-laminate, strongly setulose; maxilla 1 with 2-articulate palp, outer plate with medium-sized (not elephantine) spines, inner plate with a few unmodified setae; maxilla 2, lower lip and maxilliped of ordinary dimensions; coxa 1 slightly shortened, tapering distally and slightly concealed by coxa 2; coxa 2 large and quadrate; gnathopod 1 subchelate, no articles grossly enlarged; dactyl often bearing accessory marginal tooth; inner ramus of uropod 2 simple; outer ramus of uropod 3 biarticulate, inner ramus of normal elongation; telson cleft distinctly.

Remarks.—Three subgenera might be established within this genus, the subgenus *Lepidepecreopsis* being composed currently of one species with asetulose mandibular molar, the other 2 subgenera with

setulose molar. The two setulose subgenera would be distinguished by the presence (?name) or absence (subgenus *Tryphosella*) of an accessory dactylar tooth on gnathopod 1; however, a monographer of the genus may find that the presence or absence of the dactylar tooth is polyphyletic and thus would warrant erection of subgeneric names only as marks of convenience and not relationship. The same may be found to be true of the loss of molar setules when and if more species like *L. biloba* are discovered.

The subgenus without name mentioned above might be *Tmetonyx* if that genus were synonymized with *Tryphosella* but the distinctly quadrate, nontapering coxa 1 seems to be of significant generic value.

Tryphosella metacaecula, new species

FIGURE 38

DIAGNOSIS.—Eyes absent; lateral cephalic lobes broad but acute; antenna 1 with slight dorsodistal protrusion on article 1, accessory flagellum biarticulate, antenna 2 very slender, article 5 about two thirds as long as article 4; epistome nearly flat anteriorly, not exceeding slight anterior lobe of upper lip (reconstructed in figure); article 3 of mandibular palp scarcely more than one third as long as article 2; spines of outer plate of maxilla 1 slightly thickened and intermediate in stoutness between those of typical "*Tryphosa*" and *Hippomedon;* lobes of maxilla 2 subequal in length; spines of outer plate of maxilliped small and distinctly articulated; coxa 1 posterodistally beveled and tapering strongly; gnathopod 1 slender, article 5 longer than 6, palm oblique but short, dactyl with large accessory tooth; article 5 of gnathopod 2 short, about 60 percent as long as article 2, of medium stoutness, article 6 subrectangular, anterior margin scarcely convex, palm chelate, dactyl large, fitting palm and entire distal end of article 6; pereopods poorly setose, distal ends of sixth articles of pereopods 1 and 2 with slightly enlarged spine weakly curved apically (one on each side of dactyl), spines smaller and straight on pereopods 3–5; pereopods 3–5 subequal in length to each other, short for the genus; pleonal epimeron 1 posteroventrally rounded, 2 sharply quadrate, 3 prolonged into short, acute tooth; pleonite 4 with small, subtriangular, blunt dorsal hump; uropods all extending equally, uropod 3 of normal tryphosa dimensions, inner ramus exceeding apex of article 1 of outer ramus, article 2 of outer ramus 60 percent as long as article 1; telson cleft nearly three fourths of its length, each apex slightly notched, each bearing one spine.

HOLOTYPE.—AHF No. 6132, ?male, 3.0 mm. Unique.

TYPE-LOCALITY.—Station 7234, 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

FIGURE 38.—*Tryphosella metacaecula*, new species, holotype, ?male, 3.0 mm, 7234: *a*, head; *b*, pleon; *c,d*, gnathopod 2; *e*, telson; *f*, maxilla 2; *g*, gnathopod 1; *h*, maxilliped; *i*, mandible; *j–m*, pereopods 1,3,4,5; *n,o*, uropods 2,3; *p*, maxilla 1; *q*, coxa 4.

Relationship.—*Tryphosella metacaecula* has the well-developed accessory tooth of the dactyl of gnathopod 1 typical of the genus *Tmetonyx* discussed above. In J. L. Barnard's (1962a) key to the species of "*Tryphosa*" and *Tmetonyx*, *Tryphosella metacaecula* is shown to have affinities with "*Tryphosa*" *trigonica* (Stebbing, 1888); "*T.*" *groenlandica* Schellenberg (1935) and "*T.*" *intermedia* Schellenberg (1926a). Gnathopod 1 of "*T.*" *trigonica* is very slender, scarcely subchelate, the epistome broadly protrudes and the dorsal process of pleonite 4 is large and acutely erect. The epistome of "*T.*" *intermedia* strongly protrudes and coxa 1 scarcely tapers. The peduncle of uropod 2 of "*T.*" *groenlandica* exceeds in length that of uropod 1 and extends as far as the apices of the rami of uropod 3.

Tryphosella metacaecula is remarkably similar to "*Tmetonyx*" *caeculus* (Sars, 1895, pl. 35, fig. 1), hence the derivation of its name. Both share a slight dorsodistal hump and protusion on article 1 of antenna 1. The upper lip of *T. metacaecula* is damaged but is believed to be reasonably well reconstructed. It resembles that of "*T.*" *caeculus*. *Tryphosella metacaecula* differs from "*T.*" *caeculus* in the chelate palm of gnathopod 2, the subtriangular (not dorsally rounded) process of pleonite 4 (perhaps a character subject to aging or sexual dimorphism), the 2– (and not 4–) articulate accessory flagellum, the slightly shorter pereopods 1–5, the stouter uropod 3, the deeper notches of the telsonic apices and especially by the posteriorly beveled and tapering coxa 1. Coxa 1 of Sars' species has not been figured in a dissected and flattened view but presumably resembles that of *T. metacaecula*.

Tryphosella metacaecula is an unusual "tryphosa" because of the shortened third mandibular palp article but so many deep-sea lysianassids have this condition that one may wonder whether it has any generic significance (as J. L. Barnard, 1962a, believed in his establishment of the genus *Elimedon*). Perhaps low concentrations of detritus in the deep sea reduce the need for a long setose mandibular palp as a cleaning organ. Its condition in "*T.*" *caeculus* is not described by Sars.

The slightly thickened first maxillary spines are of significance to the discussions presented elsewhere on the relationships between various species of "*Tryphosa*" and *Hippomedon*.

Uristes Dana

Uristes (?) *perspinis*, new species

FIGURES 39–41

DIAGNOSIS.—Eyes absent; lateral cephalic lobes strongly projecting and extended ventrally to cover base of antenna 2; articles 2 and 3 of antenna 1 nearly completely telescoped and very short; epistome and upper lip small, scarcely distinct from one another but upper lip projecting slightly more than epistome; coxa 1 slightly smaller than coxa 2, tapering distally; article 5 of gnathopod 1 slightly longer than article 6, palm very oblique, minutely serrate, defined by two

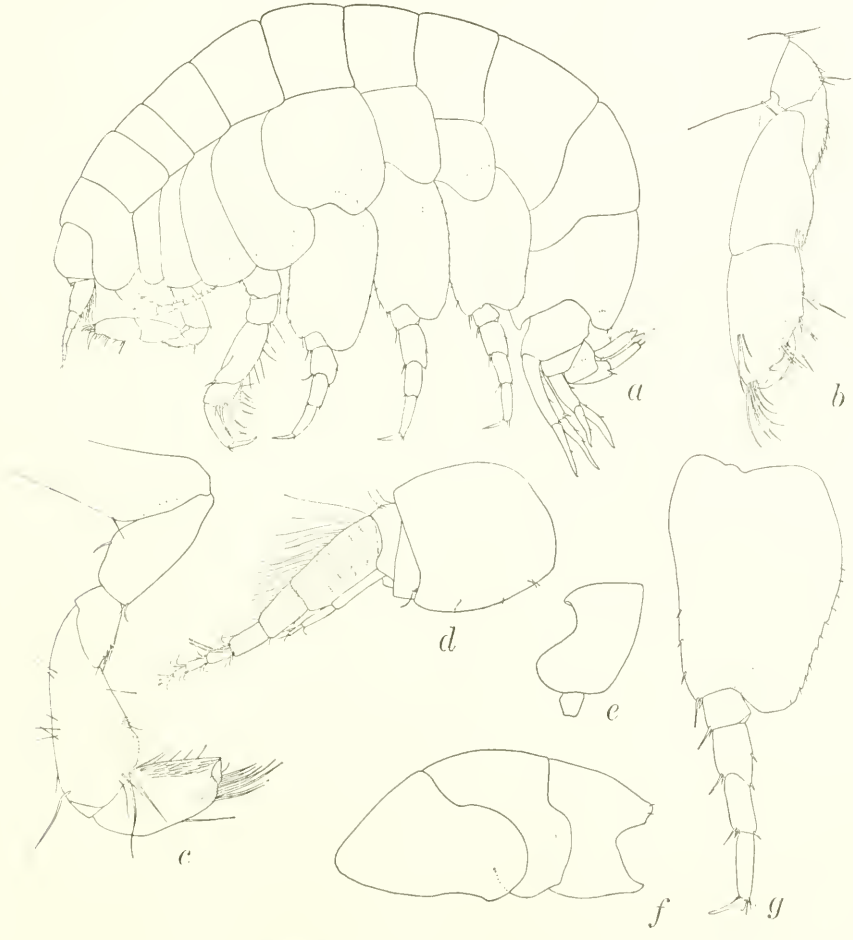


FIGURE 39.—*Uristes* (?) *perspinis*, new species, holotype, female, 3.0 mm, 7229: *a*, lateral aspect; *b,c*, gnathopods 1,2; *d*, antenna 1; *e*, head with epistome-labrum complex below; *f*, pleonal epimera 1–3, left to right; *g*, pereopod 5.

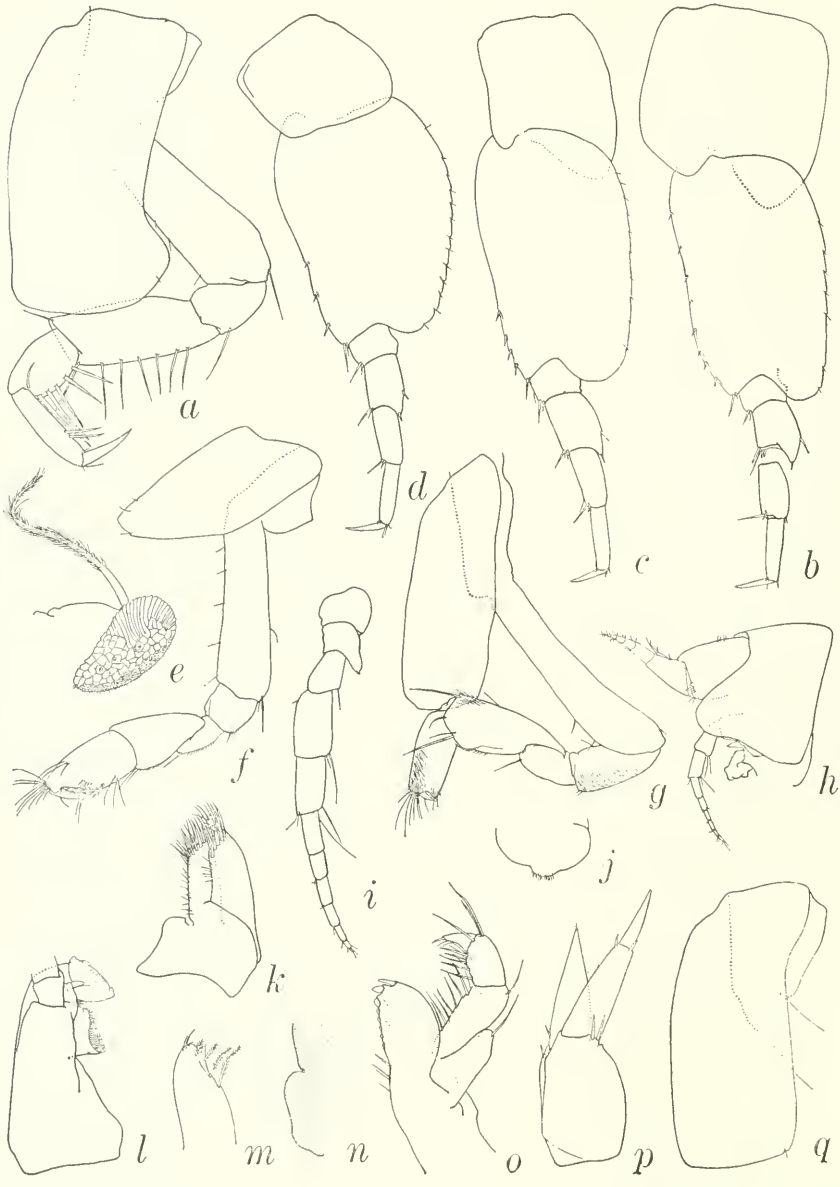


FIGURE 40.—*Uristes* (?) *perspinis*, new species, female, 4.2 mm, 7229: *a–d*, pereopods 2,3,4,5; *e*, mandibular molar; *f,g*, gnathopods 1,2; *h*, head; *i*, antenna 2; *j*, anterior view of labrum; *k*, maxilla 2; *l*, mandible, palp cut; *m*, inner plate of maxilliped; *n*, epistome-labrum complex; *o*, maxilliped, ventral view, inner plate hidden; *p*, uropod 3; *q*, coxa 3.

spines, bearing medial row of four large setae, dactyl fitting palm, strongly curved; gnathopod 2 stout, article 4 unusually short, article 5 stout, palm cheliform; pereopods 1 and 2 unusually setiferous, pereopod 2 bearing anterior spines on article 2 but spines absent on pereopod 1, posterior edge of article 5 on both pereopods bearing stout spines, posterior margin of article 6 on pereopod 1 bearing one spine, on pereopod 2 bearing two spines; posterior lobe on article 2 of pereopod 5 slightly concave posteriorly and minutely serrate; posteroventral corners of pleonal epimera 1 and 2 rounded and subquadrate respectively, epimeron 3 prolonged into large posterior tooth;

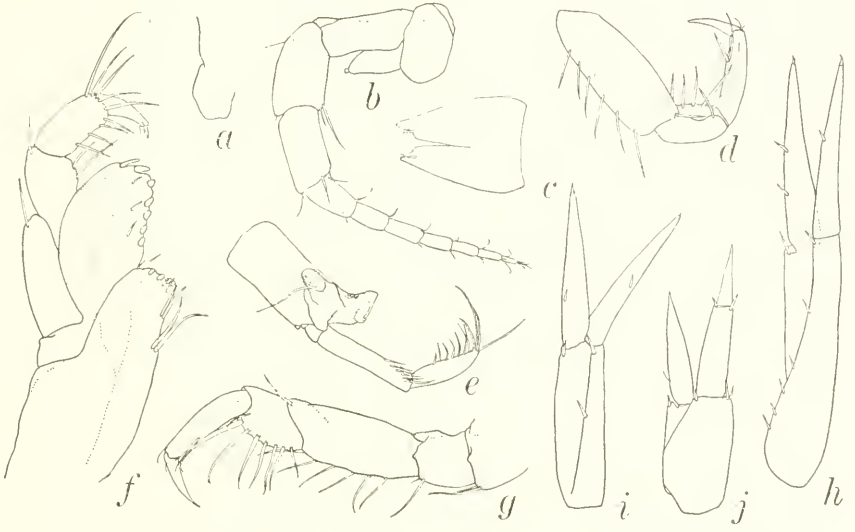


FIGURE 41.—*Uristes* (?) *perspinis*, new species, holotype, female, 3.0 mm, 7229: *a*, epistome-labrum complex; *b*, antenna 2; *c*, telson; *d*, distal end of pereopod 2; *e*, mandible; *f*, maxilliped; *g*, distal end of pereopod 1; *h–j*, uropods 1,2,3.

dorsoposterior surface of pleonite 3 slightly enlarged and bulbous; pleonite 4 scarcely produced dorsally; rami of uropods 1 and 2 with at least 1 spine each, no ramus constricted; inner ramus of uropod 3 slightly exceeding article 1 of outer ramus; telson with narrow, acute apices, each bearing medial subapical notch armed with one spine.

REMARKS.—Maxilla 1 like that of *Centromedon pumilus* (Sars, 1895, pl. 34, fig. 2), outer lobe having 11 spines; maxilla 2 like that of "*Tryphosa*" *sarsi* (Sars, 1895, pl. 27, fig. 1).

HOLOTYPE.—AHF No. 6040, female, 3.0 mm.

TYPE-LOCALITY.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

MATERIAL.—Two specimens from the type-locality.

Relationship.—The assignment of this species to a known genus is questionable, even though the diagnoses of several genera might be expanded in order to admit it. It lacks completely the aspect of *Hippomedon* Boeck (=*Paratryphosites* Stebbing, see Gurjanova, 1962) in its slightly reduced, narrowed and tapering coxa 1. Thus, it resembles "*Tryphosa*" auct. (=*Lepidepecreopsis* Stephensen, see remarks above) and *Uristes* Dana. It resembles "*Tryphosa*" more than *Uristes* in the subequal lengths of articles 5 and 6 of gnathopod 1. But *U. perspinis* differs radically from members of "*Tryphosa*" in its small and inconspicuous epistome-labrum complex. This species can be admitted to *Uristes* only by disregarding the morphology of the gnathopods. There is so slight a difference in length between articles 5 and 6 of the type-species, *U. gigas* Dana (auct.=*Tryphosa antennipotens* Stebbing, 1888), that the small quantitative difference seen in the species at hand seems admissible. But, in addition, *Uristes perspinis* differs from most other species of *Uristes* by the ventrolateral extension of the lateral cephalic lobes, in resemblance of *Uristes* (?) *lepidus* J. L. Barnard (1964b).

J. L. Barnard (1964b) pointed out that *Paracentromedon* Chevreux and Fage must be studied as a possible synonym of *Hippomedon*, but the former genus is paradoxical in its somewhat smaller coxa 1, failing to cover the head as fully as in typical species of *Hippomedon*. Coxa 1 of *Paracentromedon*, however, is not as small as in the type-species of *Uristes* or in *U. perspinis*. Hence *Paracentromedon* seems to intergrade *Uristes* and *Hippomedon*.

Uristes perspinis has a bulbous dorsoposterior process on pleonite 3, a character occasionally occurring on species of "*Tryphosa*," such as "*Tryphosa*" (=*Lepidepecreopsis*) *biloba* (Stephensen, 1925), "*T.*" *triplans* J. L. Barnard (1962a) and "*T.*" *quadrata* J. L. Barnard (1962a). *Uristes perspinis* differs from those species by the smallness of the labrum-epistomal complex and the shape of the lateral cephalic lobes.

Uristes (?) *lepidus* and *U.* (?) *perspinis* presumably are congeneric but like *Ambasiopsis fomes*, new species, they are inadmissable to existing genera without extensive diagnostic revisions of those genera. The remarks here supplement those written under *Ambasiopsis fomes* and under the heading "Lysianassidae." None of the three species mentioned above is assignable to *Schisturella* Norman because of the unconstricted rami of uropod 2 and the presence of a few molar setules (see table 1). The assignment of *A. fomes* to "*Tryphosa*" is ruled out because the labrum and not the epistome dominates the prebuccal complex. Indeed, the real problem is whether "*Tryphosa*," *Uristes*, and *Ambasiopsis* are distinct from one another. J. L. Barnard

(1962a) segregated *Uristes* and "*Tryphosa*" on the relative lengths of articles 5 and 6 of gnathopod 1. This resulted in an unnatural mixture of species with strongly and weakly developed prebuccal complexes and species with large or small heads. The ordinary species of "*Tryphosa*" has a large head and a well-developed prebuccal complex with the epistome dominating the upper lip; presumably the type-species of *Uristes* has a small head and small prebuccal complex with neither the epistome nor the upper lip dominating; the cephalic size of the type-species of *Ambasiopsis* is not described and the prebuccal complex is small, with the upper lip slightly dominating the epistome. All European tryphosas have a characteristically tapering coxa 1, the type of *Uristes* has a slightly tapering coxa 1 and the type of *Ambasiopsis* has a strongly tapering, shortened, acute coxa 1. But coxa 1 is intergraded by various species. "*Uristes*" *antennibrevis* J. L. Barnard (1962a) stands between *Ambasiopsis* and the other two genera and *Uristes barbatipes* (Stebbing, 1888) intergrades "*Tryphosa*" and *Uristes*. On the other hand, *Uristes* (?=*Pseudotryphosa*) *umbonata* Sars (1895) has an even more reduced coxa 1 than most tryphosas and much more than that of the type-species of *Uristes*.

The relative sizes of heads are difficult to measure; they are not easily related to sizes of coxae or even segments because these also vary from species to species. Nevertheless, the mouthpart groups of *Uristes* (using only the type-species and *U. umbonatus* as examples) are so reduced in size that they are hidden by the coxae, whereas in "*Tryphosa*" the mouthpart bundle is large and projects well below the anterior coxae. Few species of *Uristes* or "*Tryphosa*" outside of Europe or those erected by Stebbing have been sufficiently well described to permit an analysis of the variability of this character. The mouthparts of *Uristes antennibrevis* seem to be intermediate between those of "*Tryphosa*" and *Uristes*, although the head is relatively large. *Uristes typhlops* (Sars, 1879) has a small head bearing strongly projecting mouthparts. Sars showed coxa 1 to be expanded, but J. L. Barnard (1962a) described a subspecies with the typical coxa 1. The type and other European tryphosas have a characteristically concave anterior edge on coxa 1, whereas the type of *Uristes* and *U. umbonatus* have a slightly convex anterior edge. The generic value of this character is doubtful, however, because rearrangement of the known species on this basis would again throw together large- and small-headed species with those having large and small mouthpart clusters. For example, *U. antennibrevis* has a large head but a convex first coxal margin and *U. typhlops mediator* J. L. Barnard has a small head, small buccal mass and a convex coxal margin.

The significance of first coxal shapes as generic characters is ques-

tionable in light of the conditions in various European species of *Tmetonyx*. The type-species, *Tmetonyx cicada* (Fabricius) has a rectangular first coxa whereas other species have the tapered first coxa of "*Tryphosa*," with *Tmetonyx acutus* (Sars, 1895) representing the fully reduced tryphosa condition. Tmetonyxes also, regardless of coxae, bear large teeth on the first gnathopodal dactyls, in contrast to the ordinary species of "*Tryphosa*"; some species of "*Tryphosa*," however, have been described bearing these teeth so that definitely congeneric species have been assigned to different genera. Perhaps *Tmetonyx* should be retained for its type-species having the dactylar tooth and normally rectangular coxa and the other tmetonyxes assigned as a subgeneric group to "*Tryphosa*" (see *Tryphosella* above). This viewpoint is discussed in other places in this paper in relation to other problems.

If first coxae were disregarded as generic criteria some species of *Hippomedon*, *Anonyx*, *Tryphosites*, "*Tryphosa*," and *Uristes* might fall into the same genus. Nevertheless, the various tmetonyxes demonstrate the difficulty in defining *Uristes* and "*Tryphosa*" just on their type-species or typical species. The heads of various species of *Tmetonyx* are intermediate in size between those of *Uristes* and "*Tryphosa*" and the mouthpart projections vary from the weak condition of *Tmetonyx acutus* to the strong condition of *Tmetonyx similis* Sars. Another method of treating this problem would be the amalgamation of *Uristes*, "*Tryphosa*," and *Tmetonyx* (and other genera already synonymized with *Uristes* by J. L. Barnard, 1962a), or the retention and creation of various subgeneric names to segregate facies such as the *Tmetonyx* group with normal first coxae, the "*Tryphosa*" group with modified first coxae, the group of tmetonyxes with dactylar teeth and tryphosal first coxae (*Uristoides* Schellenberg, 1931, is an available appellation), and the *Uristes* group with small head and small prebuccal clusters. This procedure should not be attempted until the prebuccal complex of the type-species of *Uristes* can be studied more thoroughly. *Ambasiopsis* might form the fifth member of the group and a sixth group might be comprised of *Uristes lepidus* and *U. perspinis*.

The amalgamated tryphosa complex differs from the genera *Anonyx* Krøyer and *Tryphosites* Sars by the distally unexpanded (and often tapering) first coxa. As a parallel revision *Tryphosites* Sars might be assigned to *Anonyx* as a subgenus.

The generic value of first gnathopods is not altogether lost in the amalgamation of *Uristes*, "*Tryphosa*," and their allies because most species of *Uristes* have an elongated sixth article and most species of "*Tryphosa*" have an elongated fifth article.

Valettiopsis Holmes

Valettiopsis dentatus Holmes

FIGURES 42, 43

Valettiopsis dentatus Holmes, 1908, pp. 495–496, figs. 5, 6.—Gurjanova, 1962, p. 344, fig. 115.—Hurley, 1963, p. 149.

MATERIAL.—USNM Acc. No. 247045, Santa Monica Bay, Calif., hag fish trap, 183 m (11).

REMARKS.—New drawings are presented here because Holmes did not completely figure this taxon; it is the type of the genus and specimens in excellent condition are available.

The upper lip of this species is extremely elongated dorsoventrally, and the incision separating it from the epistome is hidden from lateral view by the base of antenna 2; a drawing of this from the right ventrolateral aspect is shown in fig. 42*h*.

Dactyls of pereopods 1–5 each have a subdistal slit, one or two setules and a presumed internal duct leading to the slit. The dactyl of pereopod 3 on the left side of the figured specimen has a multispinose apex, which is not typical of other specimens.

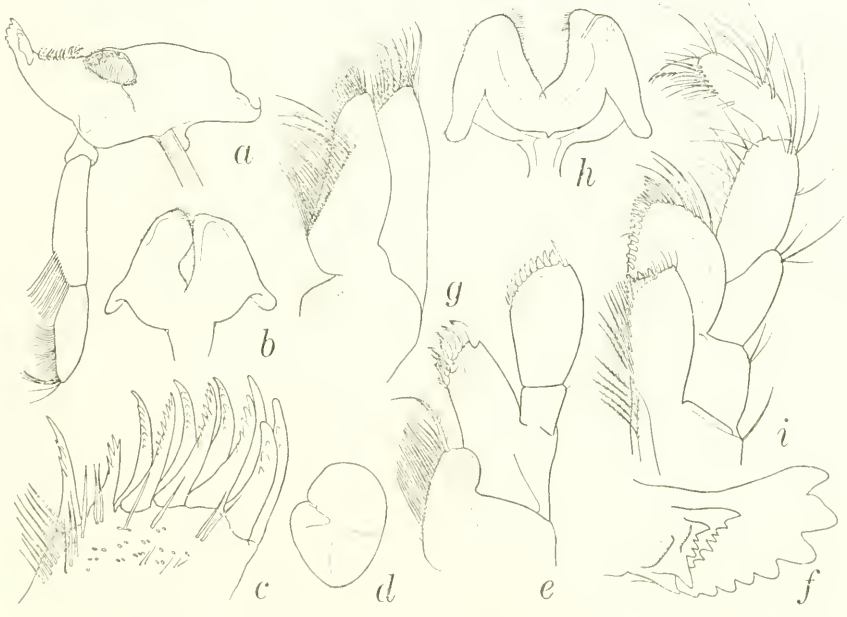


FIGURE 42.—*Valettiopsis dentatus* Holmes, male, 8.6 mm, Santa Monica Bay, Calif., 183 m: *a*, mandible; *b*, lower lip; *c*, outer plate of maxilla 1, dorsal; *d*, upper lip from anterior view showing asymmetric dorsolateral notch; *e*, maxilla 1, ventral; *f*, apex of right mandible. Male, 8.9 mm: *g*, maxilla 2; *h*, lower lip; *i*, maxilliped.

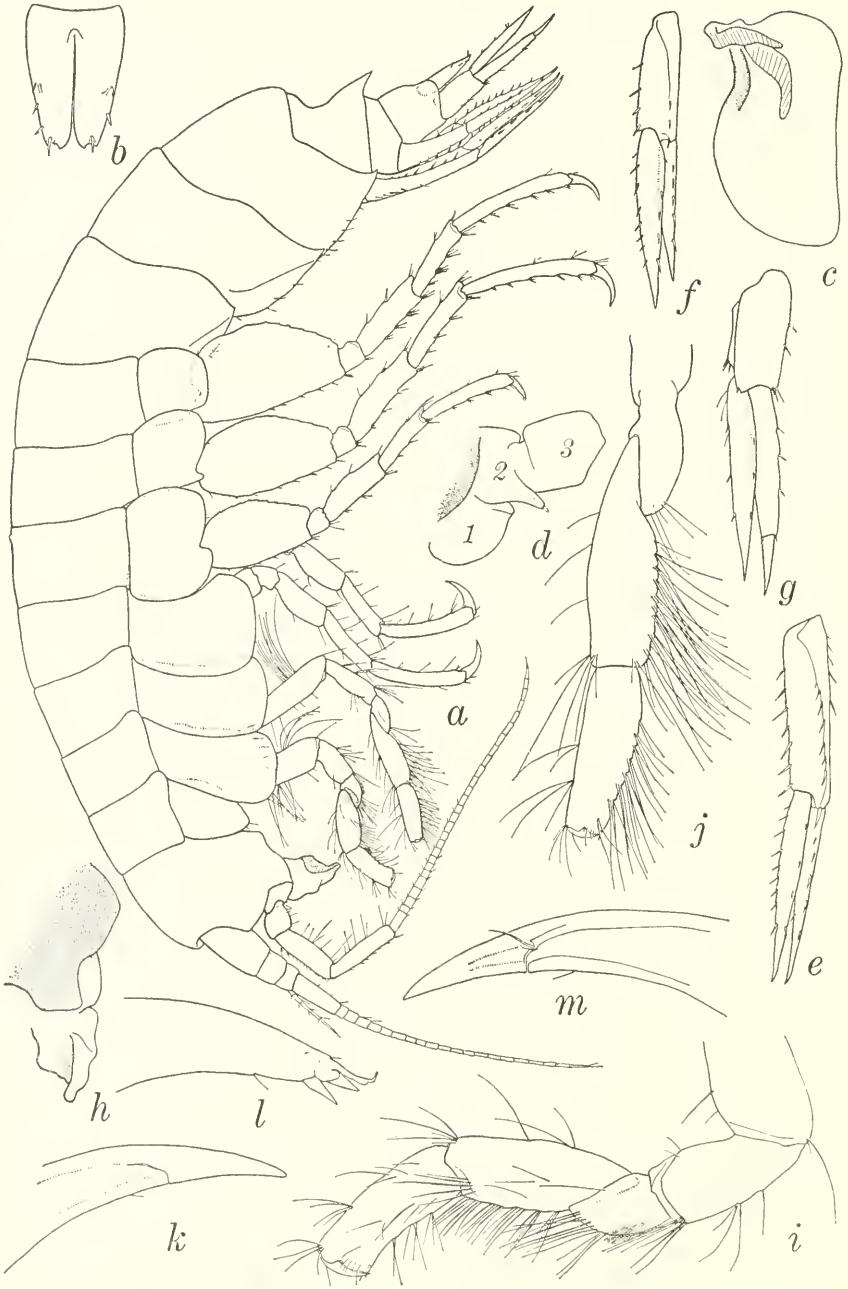


FIGURE 43.—*Valettiopsis dentatus* Holmes, male, 8.6 mm, Santa Monica Bay, Calif., 183 m: *a*, lateral aspect; *b*, telson; *c*, left gill of pereopod 4 showing accessory gills; *d*, medial view of base of antenna 2 showing gland cone, mediolateral cephalic surface shaded; *e–g* uropods 1,2,3; *h*, lateral view of epistome and upper lip, right side, cephalon shaded; *i,j*, gnathopods 1,2; *k–m*, dactyls of percopods 5,3,2, that of pereopod 3 aberrant and unique, lateral views.

Gills occur on pereonites 2–7; they are large, unplaited and have one accessory appendage each, except that of pereonite 6, which has two; gills of gnathopod 2 and pereopod 1 are the largest and are basally folded more complexly than succeeding gills; the next 3 gills are of medium size (see figure of gill of pereopod 4) and the gill of pereopod 5 is smallest, scarcely larger than its coxa. Accessory appendages are tubular, but on some gills they are basally tumid or have rounded basal lobes.

Only one female occurs in the samples; it lacks any secondary sexual differences from the male. The brood lamellae are rudimentary.

Distribution.—Southern California, 183–513 m.

Oedicerotidae

Relationships of the Genera *Aceroides, Anoediceros, Arrhis, Lopiceros, Monoculodes, Oediceroides,* and *Patoides*

A number of intergrading species discovered in the last four decades have obscured the strong distinctions formerly known for the genera *Oediceroides* Stebbing, *Aceroides* Sars, *Arrhis* Stebbing, and *Monoculodes* Stimpson. The four type-species of those genera might be visualized as standing on the four corners of a square. A number of intersections and intermediate positions among the several genera would occur if a series of lines connecting all four positions is drawn. The corners holding the type-species of *Monoculodes* and *Oediceroides* (including *Patoides*) are surrounded by tight clusters of numerous species that closely resemble the types. The corners holding *Arrhis* and *Aceroides* have one or two species each. In various intermediate positions among all four genera stand such species as (1) *Monoculodes latissimanus* Stephensen (1931), which might also be assigned to *Oediceroides;* (2) "*Oediceroides*" (*Patoides*) *synparis* J. L. Barnard (1964b), which bridges the gap between *Oediceroides* and *Aceroides* but which also has connections with *Arrhis;* (3) a new species of "*Patoides*" to be described, which is highly atypical of *Patoides;* (4) a new species of "*Aceroides*," which is atypical of *Aceroides* and has several characters of *Patoides;* (5) *Oediceroides* (*Lopiceros*) *forensia*, which differs in several ways from typical species of *Oediceroides;* and (6) the several species now assigned to *Aceroides*, *A. kobjakovae* Bulycheva (1952), *A. sedovi* Gurjanova (see 1951) and *A. limicola* K. H. Barnard (1925).

Arrhis Stebbing, with its type-species *A. phyllonyx* (M. Sars) (see G. O. Sars, 1895) and its congener *A. luthkei* Gurjanova (1936, 1951) may be eliminated from the discussion as a cohesive pair distinguished by the westwoodilla mandible having an essentially untoothed, poorly projecting cutting edge. *Arrhis* completely lacks a rostrum, has an elongated antenna 1 with long article 2, equal to (*A. luthkei*) or much longer than (*A. phyllonyx*) article 1 and combines these characters with normal oedicerotid pereopods 1 and 2 and subchelate gnathopods having posterior lobes on the fifth articles that either do (on gnathopod 2) or do not (on gnathopod 1) guard the sixth articles.

Aceroides Sars (1895) was erected with special reference about similarities to *Halicreion* Boeck, a genus distinct from those under discussion because of the elongated uropod 3; but *Halicreion* must be kept in mind because uropod 3 often is lost in specimens being described as new species. Sars also wrote remarks on *Arrhis* (then known as *Aceros*) which established such characters of generic importance as differences in mandibles, lengths of first antennae and their articles, and rostra. To a large extent, however, rostra and antennae have been used as secondary generic characters in subsequent years, e.g., *Oediceroides antennatus* K. H. Barnard (1937), which was accepted into *Oediceroides* even though it has elongated articles of antenna 1. The plethora of variations in rostra of *Monoculodes*, *Westwoodilla*, *Bathymedon*, and *Oediceroides* apparently has been so overwhelming as to be ignored at the generic level. Sars also was aware of differences in first antennae in his erection of *Monoculopsis* and its distinction from *Monoculodes.*

The extreme reduction in the rostrum of *Arrhis* is realized in deep-sea species discovered in the last few decades, such as the type-species *Anoediceros hanseni* Pirlot (1932), *Oediceroides* (*Patoides*) *synparis*, *O.* (*Lopiceros*) *forensia*, several species of *Bathymedon*, *Aceroides limicola*, and several new species described herein. These taxa also lack eyes, and specimens often have badly damaged uropods and antennae. Therefore, they are difficult to classify because many shallow-water genera are distinguished by ocular structures and a few by the length of uropod 3.

K. H. Barnard (1925, p. 350) complained of the large number of monotypic oedicerotid genera in assigning his *A. limicola* to *Aceroides* but he might have been justified in erecting a new genus on the basis of the strongly projecting mandibular cutting edge. This edge is short and blunt in the type-species, *Aceroides latipes* (Sars) (see 1895).

All species of *Monoculodes* have a well developed rostrum strongly projecting beyond the lateral cephalic lobes; it is usually longer than half the length of article 1 of antenna 1. Most species of *Monocu-*

lodes have the posterior lobe of article 5 of gnathopod 2 curved distalwards, elongated, and guarding article 6, although this condition is poorly developed in *M. latissimanus*, *M. mertensi* Gurjanova (1951) and *M. glyconica* J. L. Barnard (1962d). The first antenna is scarely shorter than the second, the peduncle of the first antenna projects at least halfway along article 4 of antenna 2, and article 3 of antenna 1 is less than half (usually one third) as long as article 1. *Monoculopsis* Sars differs from *Monoculodes* by the extension of antenna 1 beyond antenna 2 and the elongated article 3, which is as long as article 1.

Oediceroides includes species having a very short antenna 1, which rarely extends as far as the end of the peduncle of antenna 2 and often only to the end of article 4 of antenna 2, the peduncle apparently never extending more than halfway along article 4 of antenna 2. In contrast, antenna 2 is relatively much larger, longer, and stouter than in *Monoculodes* and often is characterized by article 4 being stouter and longer than article 5. The posterior lobes of the fifth articles of gnathopod 2 are very short, often stand erect and do not guard article 6, although exceptions occur. The rostra of *Oediceroides* are elongated, as in *Monoculodes*, but often are of more bizarre shape, although *O. cystifera* and *O. brevirostris*, both of Schellenberg (1931), have shortened rostra. Indeed, the generic position of the latter two species should be reconsidered carefully because the former has an accessory eye and both have very slender antennae with little resemblance to other species of *Oediceroides*. Their antennae and rostra do resemble those of some of the deep-sea species.

Oediceroides and *Monoculodes* have strongly projecting and toothed mandibular cutting edges, large, blunt triturative molars and very long, strongly setose mandibular palps.

The type-species of *Aceroides* differs from *Oediceroides* and *Monoculodes* in the weakly projecting and poorly toothed primary mandibular cutting edge, and the relatively weaker palps, either thinner, slightly shorter or less setose than those of *Oediceroides* and *Monoculodes*. The rostrum of *Aceroides* extends scarcely one third along article 1 of antenna 1. A long posterior lobe is present on article 5 of gnathopod 2 but it does not completely guard article 6. Furthermore, coxae 3 and 4 are excavated ventrally and pereopods 1 and 2 are strongly modified: article 4 is widely expanded, has a strong midlateral row of setae, has article 5 shortened, inflated, posteriorly extended or lobate, and article 7 is a large, flat saber. This condition of coxae and pereopods 1 and 2 is typical of *Oediceroides* (*Patoides*) *synparis*, although the dactyls of that species are poorly saber shaped

and article 6 is very slender. The condition of dactyls is mixed in *Monoculodes*, for in some species they are long and saber shaped [*M. longirostris* (Goës)] whereas they are very short and clawlike in other species [*M. carinatus* (Bate)]. Most members of *Oediceroides* have the large, saber-shaped dactyls. This character alone appears to have no strong generic value. *Aceroides sedovi* is similar to *A. phyllonyx* in the aspect of pereopods but article 5 is more weakly lobate.

Aceroides kobjakovae Bulycheva (1952) has the ventrally excavate coxae and lateral row of setae on article 4 of pereopods 1 and 2 but article 5 is neither shortened nor lobate; the mandibular cutting edge projects strongly and is as well toothed as it is in *Monoculodes* and *Oediceroides* but it is unlike the type-species of *Arrhis*. Furthermore, the mandibular palp of *A. kobjakovae* is powerful. Article 2 of antenna 1 is as long as article 1, in contrast to *A. latipes* Sars. *Aceroides limicola* has a small rostrum, excavate coxae and similar articles 4–6 of pereopods 1 and 2 but differs from *A. kobjakovae* by the distally expanded coxa 1, the long article 2 of antenna 1, the unguiform, unexpanded pereopodal dactyls, which are shorter than article 6, and the rather strongly setose inner plate of maxilla 1 (with 6 setae). K. H. Barnard (1925) remarked that the inner lobes of the lower lip of *A. limicola* are completely coalesced; except for this character, which is unknown in *O.* (*Patoides*) *synparis*, the two species would be congeneric and more closely similar to each other than they are to *Aceroides latipes*. *Aceroides limicola* and *O. synparis* correspond in antennae, mandibles, gnathopods, and pereopods and differ from each other only by the unexpanded coxa 1 and the distally rounded (not slightly emarginate) telson of *O. synparis*. *Aceroides kobjakovae* is removed from this pattern only by the unmodified article 5 of pereopods 1 and 2 and the more strongly saber-shaped dactyls. This combination is thus a bridge to *A. latipes* and *A. sedovi* Gurjanova, but both of those species have a less strongly produced mandibular cutting edge, while *A. sedovi* has a more powerful mandibular palp than does *A. latipes*. Thus, *A. latipes*, the type-species, is the most specialized member of the group.

The *Aceroides* complex differs from all species of *Oediceroides* (if the two species mentioned above are removed) by the very short or obsolete rostra. A species to be described in sequel has lost all vestiges of the rostrum as in *A. phyllonyx*.

Because the gnathopods of *Aceroides* are more like those of *Monoculodes* than of *Oediceroides*, the condition of the short or obsolete rostra of *Aceroides* is highly pertinent as a generic character. The great variability in pereopods 1 and 2 of the *Aceroides* complex, relative to

Oediceroides and *Monoculodes*, leaves no mark of distinction but the rostrum of *Aceroides;* however, no known species of *Oediceroides* or *Monoculodes*, except *O. synparis*, has ventrally excavate coxae 3 and 4. Thus, *O. synparis* is removed to *Aceroides* and joins *A. limicola*, *A. sedovi*, *A. kobjakovae* and *A. latipes*.

Oediceroides (*Lopiceros*) *forensia* J. L. Barnard (1961) remains problematical but it is similar to various species of *Oediceroides* in its gnathopods, mouthparts, coxae, and pereopods. On the other hand, it differs from members of *Oediceroides* in its abnormally long antenna 1, its short rostrum, its abnormally short antenna 2, and the basally inflated flagellum of antenna 2.

Anoediceros Pirlot (1932) is a genus of dubious position. It resembles *Oediceroides* in its somewhat similar antennae, although antenna 1 of *Anoediceros* is longer than that of typical members of *Oediceroides*. The rostrum of *Anoediceros*, like that of *Aceroides*, is obsolescent. The monotypic *Anoediceros* has none of the characters distinguishing the subgenus *Lopiceros*, nor the coxae distinguishing *Aceroides*. It differs from *Oediceroides* mainly in the presence of a small bifid spine on the outer lobe of maxilla 2, a small but rather unusual character for a gammaridean genus but it is mimed by the distinctive, simple, and short spine of *Aceroides synparis*.

Aceroides Sars

Aceroides Sars, 1895, p. 340.—Stebbing, 1906, pp. 254–255.
(*Patoides*) J. L. Barnard, 1964b, p. 33 (as a subgenus).

Emended diagnosis.—Basal articles of antenna 2 not swollen; rostrum obsolescent, or absent, not extending more than one third along article 1 of antenna 1; mandible variable, with weakly or strongly projecting primary cutting edge bearing weak or strong teeth (but never as short, blunt or simple as the mandibles of *Westwoodilla*, *Bathymedon*, or *Arrhis*); mandibular palp present, triarticulate, variable in size and setation, mandibular molar large, triturative; (inner plates of lower lip separate in type-species but apparently fused in some other species); inner plate of maxilla 1 with 1 to 6 setae, (thus highly variable for an oedicerotid genus); maxilla 2 with or without short, distinct spine on outer lobe; gnathopods subchelate, stout, palms oblique, fifth articles bearing posterior lobes, those of gnathopod 2 almost or fully guarding article 6; coxae 3 and 4 excavate below; coxa 4 not produced posteriorly; pereopods 1 and 2 highly variable, generally article 4 with conspicuous midlateral row of setae, article 5 expanded or not, article 6 expanded or very slender, article 7 long, either slender or very expanded and saber shaped;

UROPOD 3 NOT GROSSLY EXTENDING BEYOND UROPODS 1 AND 2; body segments not carinate.

TYPE-SPECIES.—*Halicreion latipes* G. O. Sars.

REMARKS.—The capitalized portions of the diagnosis form the most important combination of characters.

Key to the Species of *Aceroides*

1. Article 4 of gnathopod 1 with large posterodistal process nearly equaling that on article 5 2
   Article 4 of gnathopod 1 lacking posterodistal process or with short acute process much smaller than that on article 5 4
2. Length of lobe on article 5 of gnathopod 2 greatly exceeding posterior margin of article 6, palm longer than posterior margin . **A. synparis** J. L. Barnard
   Length of lobe on article 5 of gnathopod 2 equaling posterior margin of article 6, palm shorter than posterior margin 3
3. Articles 4–5 of pereopods 1–2 weakly expanded, article 2 of pereopod 3 unexpanded and article 6 not longer than 5 . . . . . **A. edax,** new species
   Articles 4–5 of pereopods 1–2 strongly expanded, article 2 of pereopod 3 expanded and article 6 much longer than 5 . . . **A. limicola** K. H. Barnard
4. Posterior process on article 5 of gnathopod 1 blunt, subrounded, scarcely turned distalwards and not guarding article 6 5
   Posterior process on article 5 of gnathopod 1 subacute, turned distalwards and guarding most of posterior margin of article 6 6
5. Palm of gnathopod 2 shorter than posterior margin of article 6, process of article 5 extending one third along posterior margin of article 6, article 4 of gnathopods with small, acute process, article 2 of mandibular palp straight. **A. callida,** new species
   Palm of gnathopod 2 longer than posterior margin of article 6, process of article 5 extending more than halfway along posterior margin of article 6, article 4 of gnathopods with obsolescent, blunt process, article 2 of mandibular palp curved . . . . . **A. kobjakovae** Bulycheva
6. Dactyls perfectly fitting gnathopodal palms, hands expanded distally, process on article 5 of gnathopod 1 stout, article 3 of mandibular palp tapering symmetrically, ovately elongate . . . . . **A. latipes** (Sars)
   Dactyls overriding gnathopodal palms, hands unexpanded or slightly tapering distally, process on article 5 of gnathopod 1 very thin, article 3 of mandibular palp slender but subfalciform . . . . . **A. sedovi** Gurjanova

Aceroides callida, new species

FIGURE 44

DIAGNOSIS.—Rostrum almost completely absent, front of head weakly bulbous, with slightly erect anterodorsal ridge; lateral cephalic lobes rather narrow and projecting, but apically rounded; eyes absent; [antenna 1 missing;] antenna 2 slender, short, gland-cone small but sharply distinct; epistome rounded anteriorly; mandibular palp

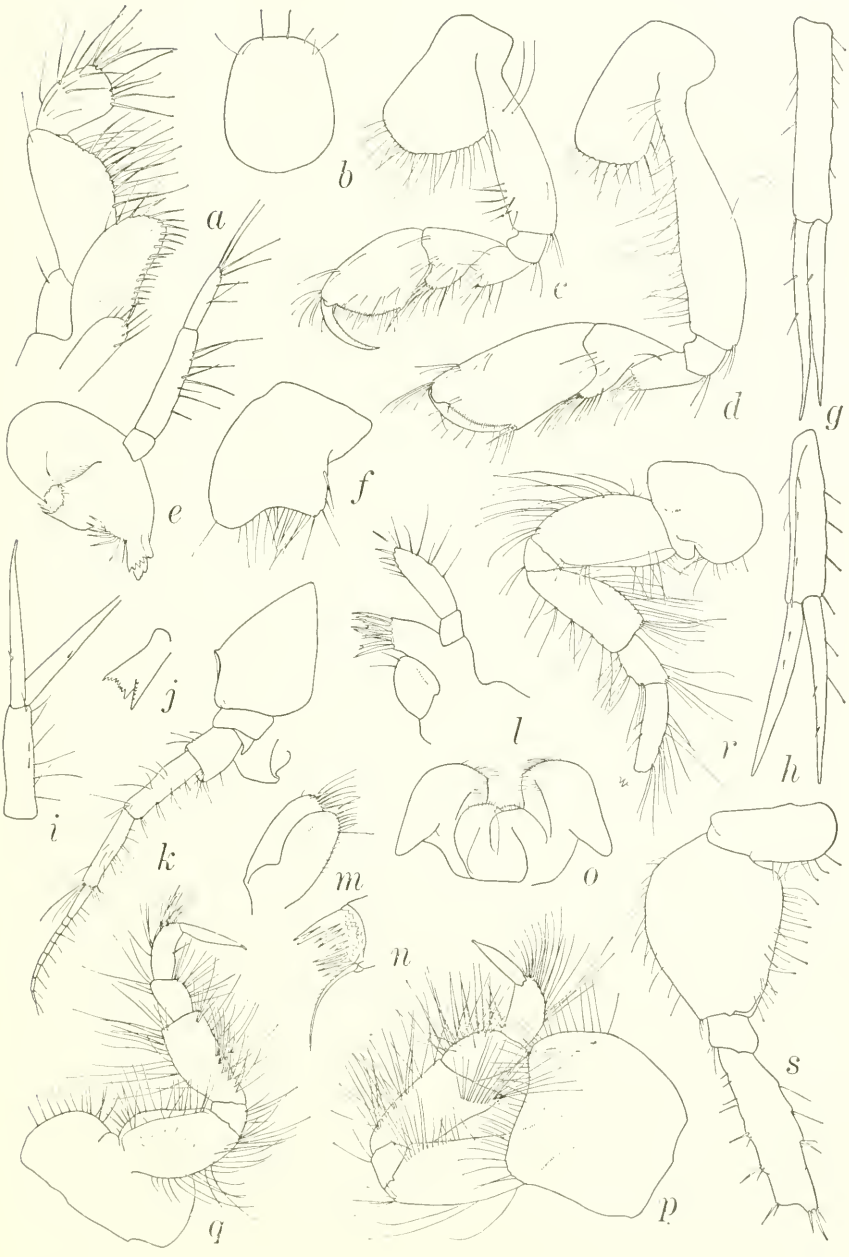


FIGURE 44.—*Aceroides callida*, new species, holotype, male, 8.0 mm, 7358: *a*, maxilliped; *b*, telson; *c,d*, gnathopods 1,2; *e*, left mandible; *f*, coxa 3; *g–i*, uropods 1,2,3; *j*, lacinia mobilis of right mandible; *k*, head and antenna 2; *l,m*, maxillae 1,2; *n*, right mandibular molar; *o*, lower lip; *p–s*, pereopods 2,3,4,5.

straight, article 3 much shorter than article 2, palp moderately setose, article 2 straight, molar cup shaped, small, one side of cup-rim with long cusps; inner lobes of lower lip separated; inner plate of maxilla 1 with two setae, outer with nine spines; coxa 1 moderately expanded ventrally; fourth articles of gnathopods with acute apicoposterior cusp, fifth articles produced to short lobes of medium breadth, lobe on gnathopod 2 distinctly guarding article 6 and extending about one third along posterior edge of article 6; palm and posterior margin of article 6 on gnathopod 1 subequally long, palm about three fourths as long as posterior margin of article 6 on gnathopod 2, latter article elongated; pereopods 1 and 2 similar to each other, article 4 with mid-lateral row of setae, article 5 not differentially expanded in comparison with article 6, latter slightly narrower than fifth but not distinctly slender, dactyl saber shaped, stout; dactyls of pereopods 3–5 (damaged) also saber shaped; telson apically truncate, slightly convex, armed with two slender, medial setae, and various lateral setae.

Holotype.—AHF No. 6126, male, 8.0 mm. Unique.

Type-locality.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

Relationship.—According to the foregoing key this species has its closest resemblance to *Aceroides kobjakovae* Bulycheva (1952). The two species have poorly developed posterior lobes on the fifth articles of gnathopod 1 and differ from each other in the gnathopodal palms and length of fifth articles of gnathopod 2. They also differ by the condition of article 2 of the mandibular palp, as stated in the key; this variable is one used elsewhere in the Oedicerotidae to distinguish genera, e.g., *Bathymedon* Sars and *Westwoodilla* Bate.

Aceroides edax, new species

Figures 45, 46

Diagnosis.—Rostrum almost completely absent; anterolateral cephalic margins nearly straight, poorly produced, broad in holotype, but with well-developed quadrate lobes in other specimens; eyes absent; epistome-labrum with blunt anterior cusp, with slight notch in retarded dorsal portion above cusp; mandibular palp straight, articles 2 and 3 equal in length, palp moderately setose, article 2 straight, molar cup shaped, small, one side of cup-rim with long cusps; inner lobes of lower lip separated; inner plate of maxilla 1 with three setae, outer with eight spines; coxa 1 moderately expanded below; fourth articles of gnathopods with blunt apicoposterior process, fifth articles produced to long slender lobes, lobe on gnathopod 2 distinctly guarding article 6 and extending along posterior edge nearly to defining

corner of palm; palm of gnathopod 1 slightly longer than posterior margin of article 6, subequal on gnathopod 2; pereopods 1 and 2 similar to each other, 2 slightly more slender, article 4 with midlateral setal row, article 5 differentially expanded in comparison to article 6,

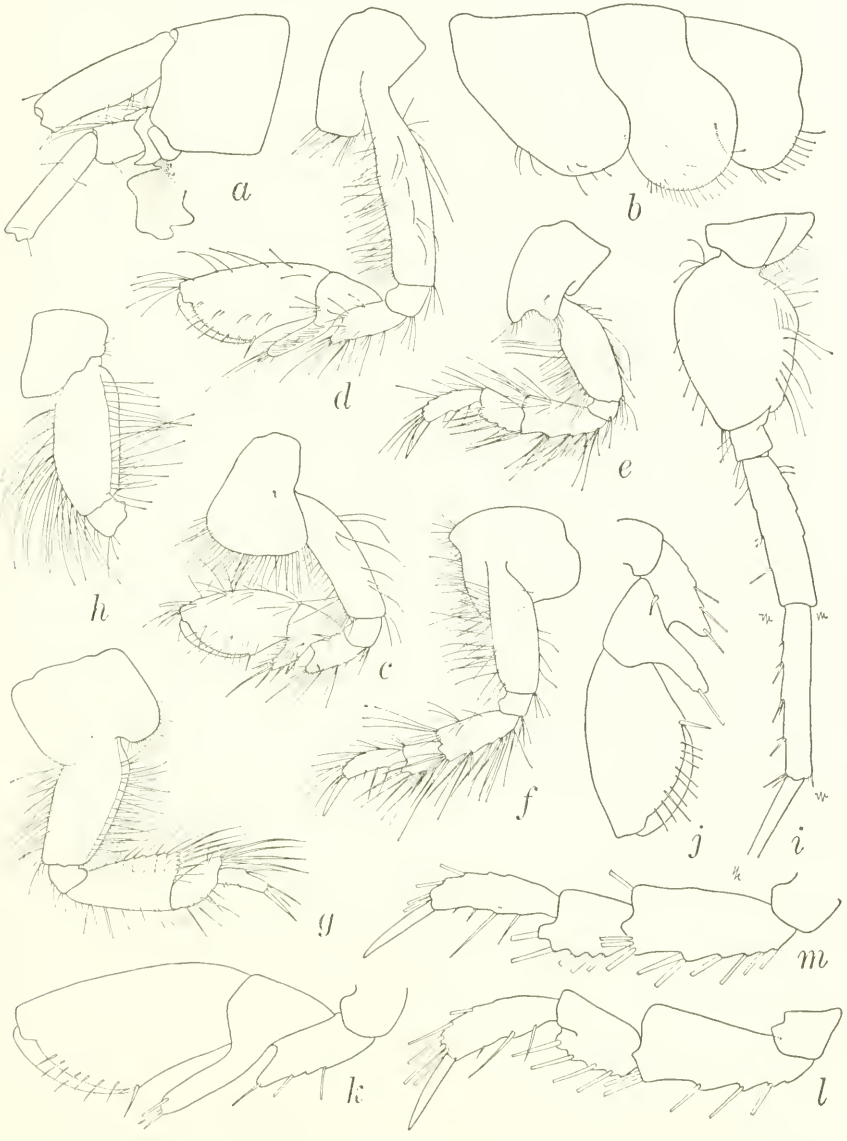


FIGURE 45.—*Aceroides edax*, new species, holotype, male, 6.0 mm, 7358: *a*, head, bases› antennae and labrum; *b*, pleonal epimera 1–3, left to right; *c,d*, gnathopods 1,2; *e–i* pereopods 1,2,3,4,5; *j,k*, gnathopods 1,2, minus small setae; *l,m*, pereopod 1 (lateral) and pereopod 2 (medial), minus small setae.

distally produced on pereopod 1, dactyls poorly saber shaped, shorter than sixth articles; dactyls apparently not saber shaped on pereopods 3–5 (damaged); telson apically emarginate, armed with small setae.

Holotype.—AHF No. 6127, male, 6.0 mm.

Type-locality.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

Material.—Stations 7229 (2), 7231 (1 frag.), 7358 (1).

Relationship.—The diagnosis distinguishes this species from *A. callida* in gnathopods, pereopods 1 and 2 and epistome. *Aceroides synparis* (J. L. Barnard, 1961) differs from *A. edax* in its broader and shorter hand of gnathopod 2, narrower anterior coxae, and a distally rounded telson.

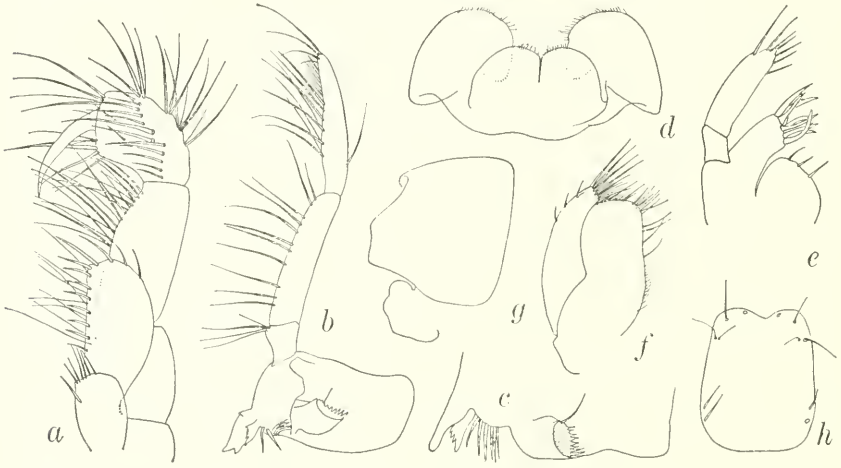


Figure 46.—*Aceroides edax*, new species, holotype, male, 6.0 mm, 7358: *a*, maxilliped; *b,c*, mandible; *d*, lower lip; *e,f*, maxillae 1,2; *g*, head and labrum, lateral; *h*, telson.

Aceroides edax closely resembles *A. limicola* K. H. Barnard (1925) in its head, telson, gnathopods, and mandible but the latter is said to have coalesced inner lobes of the lower lip, and five or six setae on the inner lobe of maxilla 1 (the specimen is 15 mm long and thus would be expected to have more setae). The principal difference appears to be in the expanded articles of pereopods 1 and 2 of *A. limicola*, which resemble those of *A. latipes* (Sars) (see 1895, pl. 120, fig. 2). Article 2 of pereopods 3 and 4 is not as ovately expanded in *A. edax* as it is in *A. limicola*.

One might consider that *Aceroides edax* and *A. synparis* (J. L. Barnard, 1964b) (described as *Oediceroides* (*Patoides*) *synparis*) of the Caribbean Sea are an analogous pair of species; *Aceroides edax*

differs from *A. synparis* in the truncate lateral cephalic lobes and the shorter lobes on the fifth articles of gnathopod 2.

Mouthparts of *A. edax* are illustrated herein. Uropods and antennae are missing from the several specimens. The aberrancy of the head of the holotype is not a result of damage; gnathopods and coxae of other specimens are identical to those of the holotype.

Bathymedon Sars

Bathymedon caino, new species

FIGURE 47

DIAGNOSIS.—Rostrum long, slender, tapering, acute, almost straight, reaching nearly three fourths along article 1 of antenna 1 and exceeding lateral cephalic lobe; eyes absent; lateral cephalic lobe broad, slightly concave distally but almost vertically truncated; epistome and labral complex large, anteriorly flat from lateral view, projecting well in front of head, rounded-off dorsally; articles 1 and 2 of antenna 1 equal in length, article 3 about one third as long as either; coxa 4 with concave posterior edge forming posteroventral subacute lobe (unusual for genus *Bathymedon*); gnathopod 1 stouter but scarcely longer than gnathopod 2, fifth articles slightly shorter than sixth, each pair of appendages with posterior lobe on article 5 (large for *Bathymedon*), lobes directed obliquely distalwards, thus partially guarding article 6, lobes separated from article 5 by mediodistal excavation, article 4 with sharp posterodistal tooth, article 6 expanding distally, palm of gnathopod 1 longer than posterior margin of article 6, slightly shorter on gnathopod 2; article 7 of pereopods 1 and 2 longer than article 6; anteroproximal surface of article 2 on pereopod 5 with nearly horizontal and strongly submarginal ridge bearing setae (unusual for *Bathymedon*), article 2 pyriform, posterior edge sloping slightly, posteroventral corner slightly lobate; uropods missing or damaged; telson truncated, bearing two large spines.

HOLOTYPE.—AIIF No. 6133, female, 6.3 mm.

TYPE-LOCALITY.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

RELATIONSHIP.—The gnathopods, especially the second, of this species resemble those of the genus *Monoculodes* in that the posterior lobe of article 5 partially guards article 6 but the mouthparts, especially the mandibles, are those of a *Bathymedon*, although the lacinia mobilis on the left mandible is enlarged and that on the right mandible is sharp (also occurring on *B. acutifrons* Bonnier). *Bathymedon caino* forms a link to *Aceroides latipes* (Sars, 1895, pl. 120, fig. 2) in its gnathopods,

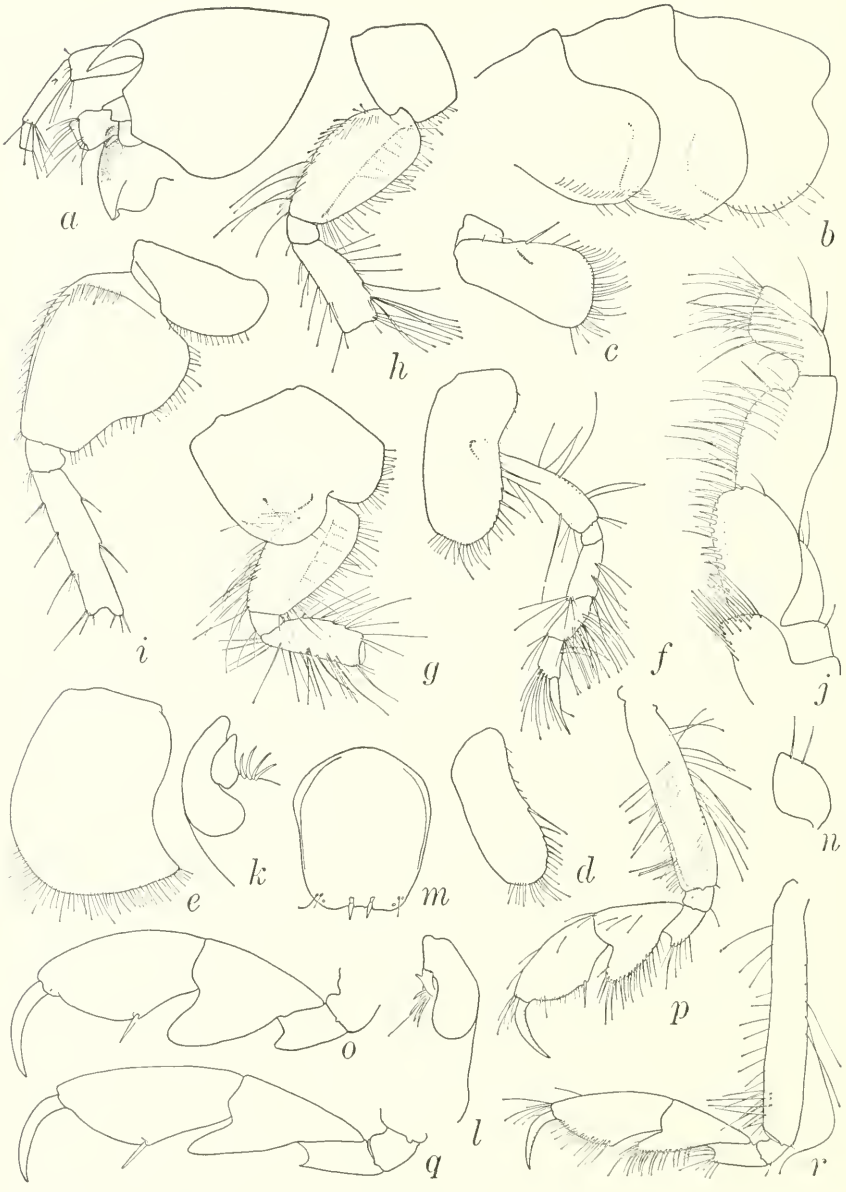


FIGURE 47.—*Bathymedon caino*, new species, holotype, female, 6.3 mm, 7358: *a*, head and labrum, lateral; *b*, pleonal epimera 1–3, left to right; *c–e*, coxae 1,2,4; *f–i*, pereopods 1,3,4,5; *j*, maxilliped; *k,l*, apices of left and right mandibles; *m*, telson; *n*, inner plate of maxilla 1; *o,p*, gnathopod 1; *q,r*, gnathopod 2.

but coxae 3 and 4 are those of a *Bathymedon* and not an *Accroides* and the mandibular palp is as large as that of *Bathymedon*. The mandibles of this species bear resemblance to those of *Arrhis phyllonyx* (M. Sars) (see G.O. Sars, 1895, pl. 119) but the well-developed rostrum and the short peduncular articles of antenna 1, plus the coxae, are distinguishing characters of *Bathymedon*.

The long rostrum differentiates *B. caino* from *B. candidus* J. L. Barnard (1961), *B. covilhani* J. L. Barnard (1961) and *B. palpalis* K. H. Barnard (1916), all of which have gnathopods faintly resembling those at hand. The greatly elongated gnathopod 2 of *B. saussurei* (Boeck) (see Sars, 1895, pl. 118, fig. 1) distinguishes it from *B. caino*. The posterior lobe of gnathopod 2, article 5, distinguishes the new species from others of *Bathymedon* having a large rostrum, such as *B. longimanus* (Boeck), *B. acutifrons* Bonnier, *B. subcarinatus* Bulycheva (1952), *B. roquedo* J. L. Barnard (1962d), *B. nanseni* Gurjanova (see 1951) and *B. langsdorfi* Gurjanova (1951).

The sharp posteroventral lobe of coxa 4 is unusual for the genus and suggests the possibility that, as an intrageneric character in *Bathymedon*, its use as a generic character in *Paroediceroides* Schellenberg (1931) and *Oediceropsis* Liljeborg is erroneous.

A male fragment of this species from 7358 has antenna 1 as long as that of *B. longimanus* and extending as far beyond the peduncle of antenna 2 as in that species but antenna 2 was only just commencing the male elongation at the time of death; the rostrum is slightly smaller than that of the female and the anterior edge of the lateral cephalic lobe is slightly more concave.

Bathymedon candidus J. L. Barnard

FIGURE 48

Bathymedon candidus J. L. Barnard, 1961, pp. 84–85, fig. 52.

Although the head is better defined in the material at hand and hence appears slightly different than the holotype (Makassar Strait), no other major differences are apparent and the specimens are identified with *B. candidus*, despite the great geographical separation of the two known collections.

Hidden among the anterodistal setae of article 5 on gnathopod 1 are several small, stout spines, not present on gnathopod 2. Their occurrence on the holotype has not been ascertained.

MATERIAL.—Station 7231 (14).

DISTRIBUTION.—Makassar Strait and middle Baja California, 2000–2398 m.

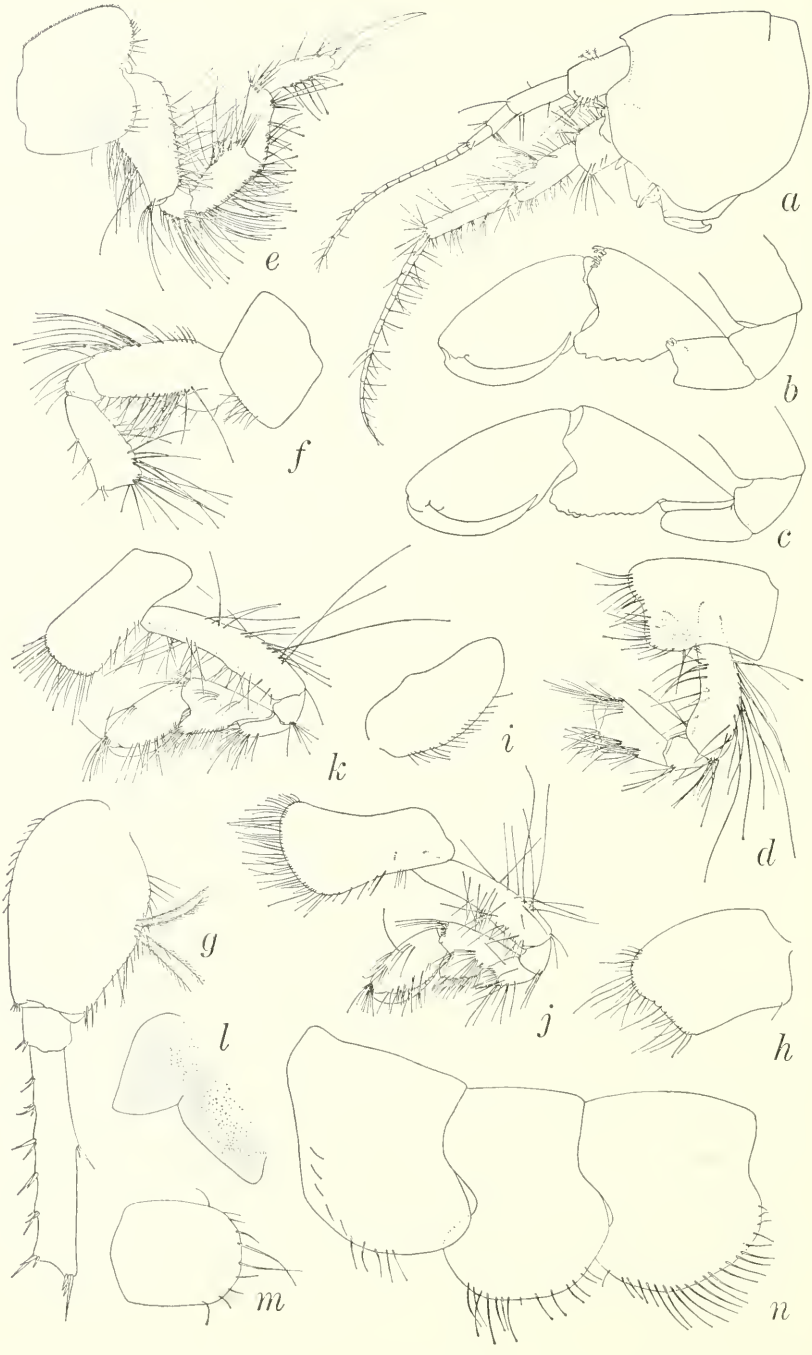


FIGURE 48.—*Bathymedon candidus* J. L. Barnard, female, 9.0 mm, 7231: *a*, head; *b,c*, gnathopods 1,2, minus setae; *d–g*, pereopods 1,3,4,5; *h,i*, coxae 4,7; *j,k*, gnathopods 1,2; *l*, leftward projecting epistome above labrum; *m*, telson; *n*, pleonal epimera 1–3, left to right.

Bathymedon covilhani J. L. Barnard

Bathymedon covilhani J. L. Barnard, 1961, p. 85, fig. 53; 1966a, p. 75, fig. 27.

MATERIAL.—Station 7229 (2).

DISTRIBUTION.—Gulf of Panama to middle Baja California, 549–1720 m.

Bathymedon flebilis, new species

FIGURE 49

DIAGNOSIS.—Rostrum obsolescent; eyes absent; lateral cephalic lobe rather ventrally located, small, subquadrate; epistome rounded anteriorly; [antennal articles damaged or broken;] coxa 4 subquadrate, much broader than coxa 3, scarcely excavate posteriorly and not lobate; gnathopods of equal stoutness, gnathopod 2 much longer than 1, fifth article much longer than sixth, that of second gnathopod 1.3 times as long as article 6, gnathopod 1 with small posterior lobe on article 5, lobe symmetrically rounded and not demarcated from article, lobe scarcely evident on long fifth article of gnathopod 2, article 4 lacking posterodistal tooth, article 5 strongly and asymmetrically expanded distally, thus palms much longer than posterior margins of sixth articles; article 7 of pereopods 1 and 2 slightly longer than article 6; anteroproximal surface of article 2 of pereopod 5 with nonsetose ridge, article 2 broadly ovate, nearly subcircular, posterior edge rounded and sloping to obsolescent posteroventral corner; telson truncated, probably bearing two distal setae but only one detectable, other minor setae asymmetrically situated.

REMARKS.—Mouthparts similar to those of *B. longimanus* (Boeck) (see Sars, 1895, pl. 117) but right lacinia mobilis bifid, each molar bearing one long hemi-plumose seta, grinding cusps poorly developed on one edge of molar; outer lobes of lower lip more rounded than in *B. longimanus;* inner plates of maxilliped with oblique apical edges.

Antennae, appendages and uropods are badly broken; the ventral edges of pleonal epimera 2 and 3 apparently are sparsely setose.

HOLOTYPE.—AHF No. 6114, female, 5.4 mm.

TYPE-LOCALITY.—Station 7231, 27°24′00″ N, 115°12′15″ W, 2398–2475 m, Jan. 1, 1961.

MATERIAL.—Stations 7229 (1 whole and 1 badly damaged), 7231 (1).

RELATIONSHIP.—This species is similar to *Bathymedon gorneri* Gurjanova (1951) by virtue of the poorly developed rostrum, truncate telson and the general shape of the gnathopods; however, gnathopod 2 of *B. flebilis* has a much longer and more slender fifth article with poorly developed posterior lobe, than does *B. gorneri.* The missing first antennae prevent a further comparison with *B. gorneri. Bathymedon ivanovi* Bulycheva (1952) also is similar to *B. flebilis* but

apparently has a slightly larger rostrum and stouter, shorter fifth articles of gnathopod 2. *Bathymedon kassites* J. L. Barnard (1966a) is distinguished by the occurrence of two stout apical spines on the telson and the shorter fifth articles of the gnathopods. *Bathymedon*

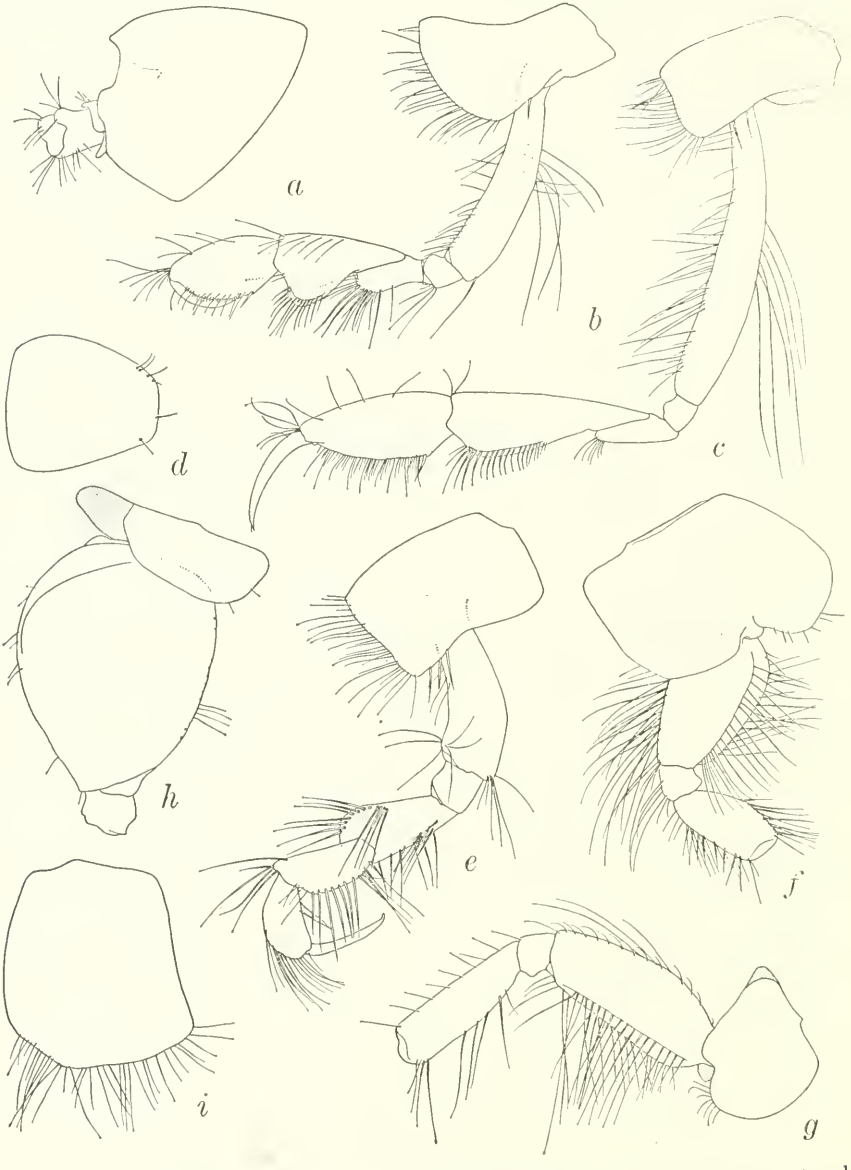


FIGURE 49.—*Bathymedon flebilis*, new species, holotype, female, 5.4 mm, 7231: *a*, head and base of antenna 2; *b,c*, gnathopods 1,2; *d*, telson; *e–h*, pereopods 1,3,4,5, some badly broken; *i*, coxa 4.

pumilus J. L. Barnard (1962d), a sympatric sublittoral relative, has an emarginate telson, narrower third and fourth coxae, a more strongly projecting posterior lobe on article 2 of gnathopod 1, an even less-developed posterior lobe on gnathopod 2 and more slender pereopods 1 and 2 than does *B. flebilis*.

Distribution.—Middle Baja California, 1748–2398 m.

Bathymedon nepos, new species

Figure 50

Diagnosis.—Rostrum long, slender, tapering, acute, nearly straight, reaching nearly two-thirds along article 1 of antenna 1 and exceeding lateral cephalic lobe; eyes absent; lateral cephalic lobe subacute, margin below point oblique; epistome subquadrate in front but not acutely produced forward; article 2 of antenna 1 longer than article 1, article 3 half as long as article 1; coxa 4 with concave posterior edge forming posteroventral subacute lobe; gnathopods equal in stoutness, fifth articles shorter than sixth, each pair of appendages with short, broad posterior lobes directed slightly distalwards, lobes separated from article 5 by mediodistal excavation, article 4 of gnathopod 2 with sharp posterodistal tooth, tooth of gnathopod 1 blunt and obsolescent, article 6 expanded distally, palms shorter than posterior margins of sixth articles; article 7 of pereopods 1 and 2 as long as article 6; article 2 of pereopod 5 subpyriform, posterior edge sloping strongly and article 2 thus tapering, posterodistal corner quadrate, unlobed, and scarcely projecting from tangent of article 3; telson truncate or perhaps scarcely emarginate, sparsely setose.

Holotype.—AHF No. 6020, male, 10.4 mm.

Type-locality.—Station 7230, 27°52′25″ N, 115°44′30″ W, 2667–2706 m, Dec. 31, 1960.

Material.—Two specimens from the type-locality.

Relationship.—This species differs from *Bathymedon longimanus* (Boeck) (see Sars, 1895, pl. 117) and *B. acutifrons* Bonnier (1896) in the short fifth article of gnathopod 2 and from *B. saussurei* (Boeck) (see Sars, 1895, pl. 117, fig. 1) by the stouter, less elongate second gnathopod. *Bathymedon ivanovi* Bulycheva (1952) has a shorter, blunter rostrum and longer fifth article of gnathopod 2 than does *B. nepos*.

The new species differs from *B. roquedo* J. L. Barnard (1962d) in the better development of the gnathopods, which have more rectangular and less triangular sixth articles, by the absence of eyes, the more slender rostrum, and the shorter telson.

FIGURE 50.—*Bathymedon nepos*, new species, female, 8.0 mm, 7234: *a*, lateral aspect; *b,c*, antennae 1,2; *d,e*, gnathopod 1; *f,g*, gnathopod 2; *h–k*, pereopods 2,3,4,5; *l*, mandible; *m*, telson.

Bathymedon caino, new species, has longer posterior lobes on the fifth articles of the gnathopods than does *B. nepos*, large terminal spines on the telson, a more strongly constructed distal portion of article 2 on pereopod 5 and a narrower coxa 4.

Monoculodes Stimpson

Monoculodes diversisexus, new species

FIGURE 51

DIAGNOSIS.—Rostrum short, straight, thick, not exceeding forward extent of truncated lateral cephalic lobes; eyes absent; body like *Monoculodes* (*?*) *sudor*, new species, having faint sculpture of pereonites, pleonal epimera similar; articles 1 and 2 of antenna 1 interequal in length, article 3 one third as long as article 1; epistome obtusely triangular anteriorly; gnathopods with very broad sixth articles, article 1 on gnathopod 1 being nearly as broad as long but on gnathopod 2 being more slender, about 85 percent as broad as long, posterior lobe of article 5 on gnathopod 1 large, projecting slightly distalwards but not guarding article 6, lobe on gnathopod 2 slender, turned distally, guarding and projecting about halfway along article 6, article 4 of both gnathopodal pairs with sharp posterodistal process; pereopodal dactyls longer than sixth articles; telson truncate, bearing two distomedial spines.

?MALE AND SOME JUVENILES.—One male fragment having flagellum of antenna 2 three times as long as articles 4 and 5 of peduncle combined, instead of being subequal to peduncle as in female; lobe on article 5 of gnathopod 2 on females, males, and juveniles shorter than 7.0 mm (to about 3.5 mm) shorter than on terminal adult, reaching about one third along article 6; article 4 having posterodistal process poorly developed or absent.

HOLOTYPE.—AHF No. 6029, female, 8.5 mm.

TYPE-LOCALITY.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

MATERIAL.—Twelve specimens from the type-locality; stations 7234 (1), 7358 (3).

RELATIONSHIP.—This species has broad gnathopods similar to those of *Monoculodes latissimanus* Stephensen (1931) and *M. abacus* J. L. Barnard (1961) but *M. diversisexus* differs from those species by the very short rostrum not exceeding the forward extent of the lateral cephalic lobes. In the genus *Oediceroides* Stebbing, *M. diversisexus* bears comparison with *O. brevirostris* Schellenberg (1931) from which it differs in the absence of eyes, the more strongly flexed posterior lobe

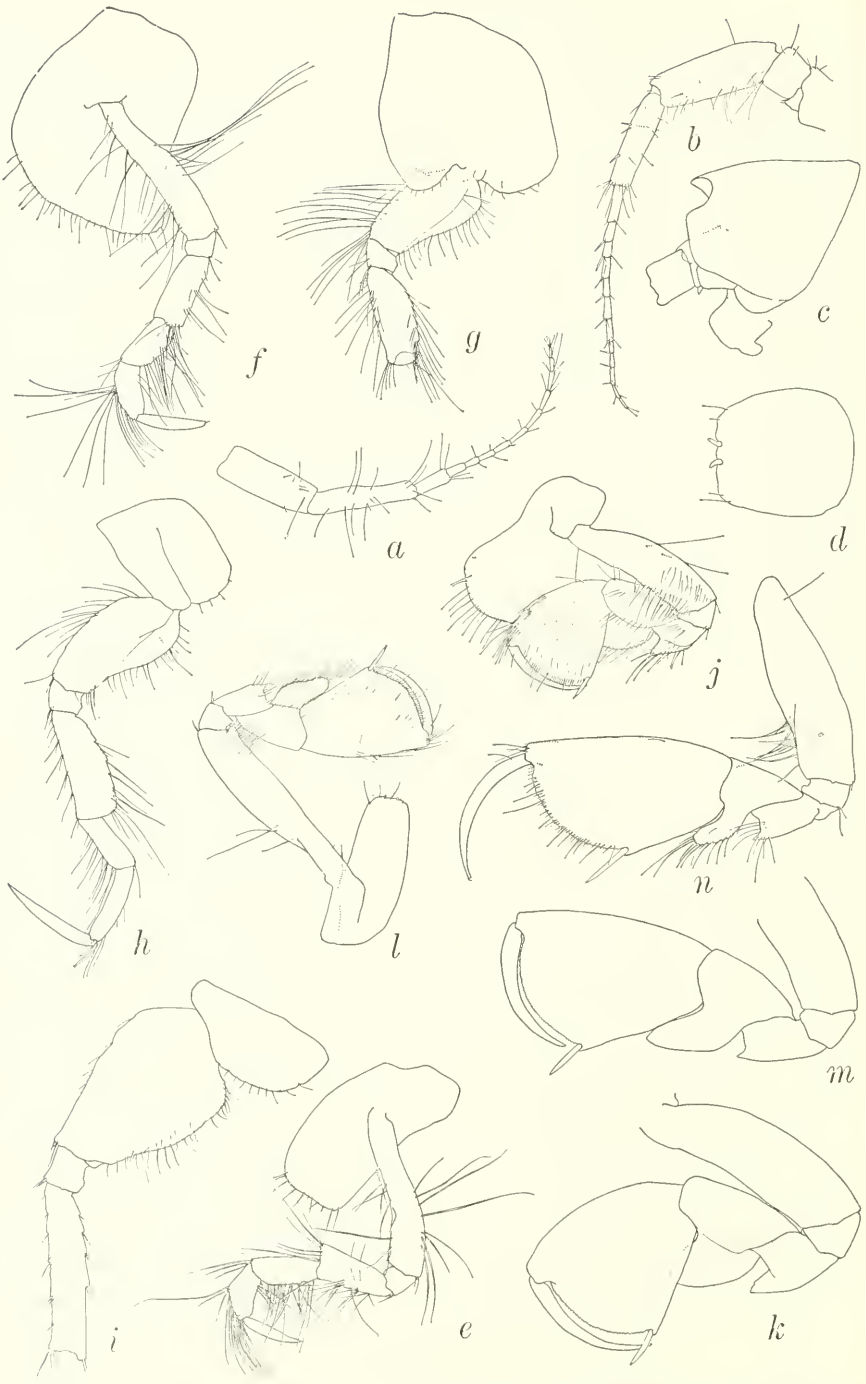


FIGURE 51.—*Monoculodes diversisexus*, new species, holotype, female, 8.5 mm, 7229: *a,b*, antennae 1,2; *c*, head and epistome-labrum complex; *d*, telson; *e–i*, pereopods 1,2,3,4,5; *j,k*, gnathopod 1; *l,m*, gnathopod 2. Male: *n*, gnathopod 2.

of article 5 on gnathopod 2, and the much broader hands of the gnathopods. In view of the small size of its second antenna, *O. brevirostris* probably should be removed to the genus *Monoculodes*.

Distribution.—Middle Baja California, 842–1720 m.

Monoculodes latissimanus Stephensen

Figure 52 *a–c*

Monoculodes latissimanus Stephensen, 1931, pp. 244–245, fig. 70.— Gurjanova, 1951, p. 585, fig. 392.—J. L. Barnard, 1966a, pp. 76–77, fig. 29.

Material.—Stations 7229 (2), 7231 (9), 7358 (1).

Distribution.—West Greenland, 1096 m; middle Baja California to southern California, 344–2398 m.

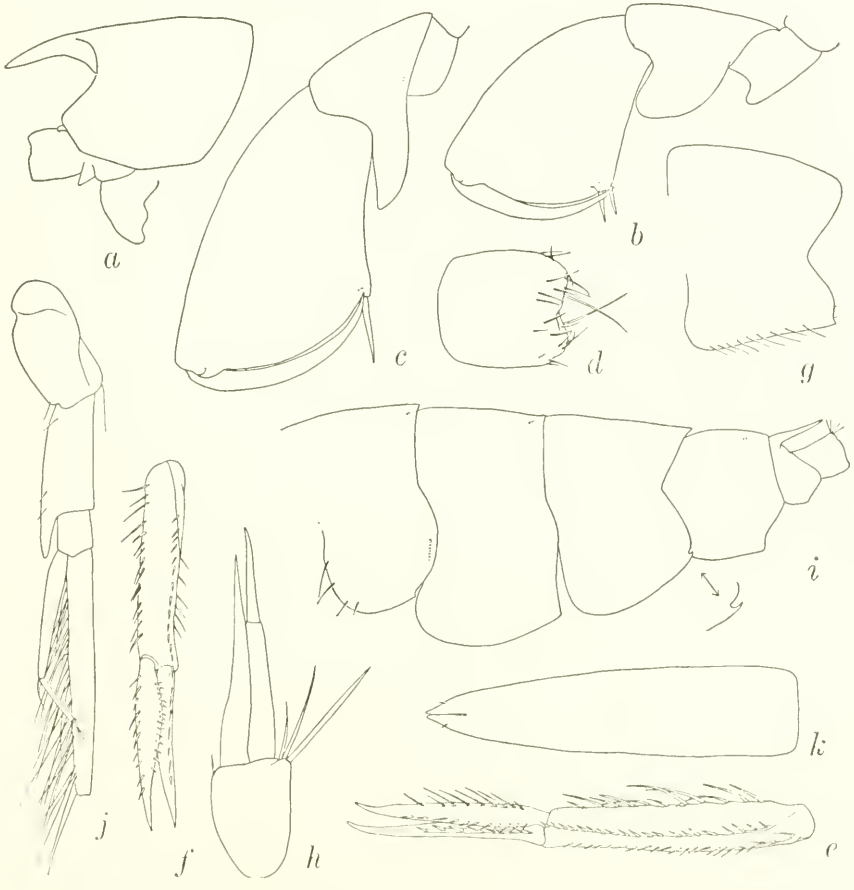


Figure 52.—*Monoculodes latissimanus* Stephensen, male, 4.5 mm, 7358: *a*, head; *b,c*, gnathopods 1,2. *Oediceroides abyssorum* (Shoemaker), female, 17.5 mm, 7229: *d*, telson; *e,f*, uropods 1,2. *Harpiniopsis naiadis* J. L. Barnard, female, 4.2 mm, 7229: *g*, pleonal epimeron 3, left; *h*, uropod 3. *Austrosyrrhoe priscis*, new species, male, 3.4 mm, 7229: *i*, pleon; *j*, proximal end of antenna 1, primary flagellum cut at base of article 2; *k*, telson.

Monoculodes necopinus, new species

FIGURES 53, 54

DIAGNOSIS.—Rostrum small, slender, straight, acute, reaching halfway along article 1 of antenna 1; lateral cephalic lobes broad, obliquely truncated, not defined anteroventrally from remainder of head; eyes absent; articles 1 and 2 of antenna 1 equal to each other in length, article 3 about one third as long as article 2; epistome broadly rounded anteriorly; gnathopods having sixth articles of medium expansion, posterior margins much shorter than palms, posterior lobes of fifth articles of medium length but extending full length of posterior margins of sixth articles and guarding them, fourth articles scarcely produced posterodistally, gnathopod 2 with slightly narrower and longer lobe than gnathopod 1; pereopodal dactyls at least as long as their sixth articles; all pleonal epimera rounded posteroventrally; telson truncate, armed with two very stout, short terminal spines.

REMARKS.—Mouthparts differ in so many details from those of *M. carinatus* Bate (see Sars, 1895, pl. 105) that they are figured herein; they have the appearance of those of *Oediceropsis brevicornis* Liljeborg (see Sars, 1895, pl. 114).

HOLOTYPE.—AHF No. 6019, male, 6.7 mm.

TYPE-LOCALITY.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

MATERIAL.—Seven specimens from the type-locality.

RELATIONSHIP.—Species of *Monoculodes* rarely lack eyes, only *M. latissimanus* Stephensen (1931), *M. coecus* Gurjanova (see 1951) and *M. abacus* J. L. Barnard (1961) having been described as anoculate. The rostrum of *M. necopinus* is unusually small and slender, being matched only by *M. latissimanus* and *M. minutus* Gurjanova (see 1951). *Monoculodes necopinus* differs from *M. latissimanus* in the less strongly expanded hands of the gnathopods and the longer posterior lobes of the fifth articles. The gnathopods of *Monoculodes abacus* J. L. Barnard are similar to those of *M. latissimanus*. The new species differs from *M. minutus* in the absence of eyes, the presence of large telsonic spines, the shorter posterior margin of article 6 and the shorter posterior lobe of article 5 on gnathopod 2.

Monoculodes necopinus differs from its sympatriot, *M. emarginatus* J. L. Barnard (1962d), in the truncated telson having two large spines (by contrast to a spineless emarginated telson), the absence of eyes, the smaller rostrum, and the more strongly truncated lateral cephalic lobes. It differs from *M. perditus* J. L. Barnard (1966a) in its shorter rostrum, absence of eyes and the occurrence of large spines on the telson.

FIGURE 53.—*Monoculodes necopinus*, new species, holotype, male, 6.7 mm, 7229: *a*, head; *b*, pleonal epimera 1–3,l eft to right; *c–f*, pereopods 2,3,4,5; *g,h*, gnathopods 1,2; *i*, coxa 3.

FIGURE 54.—*Monoculodes necopinus*, new species, holotype, male, 6.7 mm, 7229: *a*, mandible; *b*, lower lip; *c,d*, maxillae 1,2; *e*, telson; *f*, maxilliped; *g–i*, uropods 1,2,3.

Monoculodes recandesco, new species

FIGURE 55

DIAGNOSIS.—Head very broad, rostrum of medium length, moderately stout, straight, not exceeding forward extent of anterolateral cephalic margin; lateral cephalic lobes not distinct ventrally from remainder of head, very broad, anterior margin slightly oblique, straight; eyes absent; antenna 1 missing; gnathopod 1 with broadly expanded hand, palm and posterior margin distinct, palm longer than posterior margin, lobe of article 5 very broad, scarcely turned distalwards, hand of gnathopod 2 narrower and slightly longer than on gnathopod 1, dactyl slightly shorter than palm, posterior lobe of article 5 much narrower than that on gnathopod 1, turned distalwards and guarding half of posterior margin of article 6, fourth articles of gnathopods scarcely produced posterodistally; dactyls of pereopods 1 and 2 as long as sixth articles; pleonal epimera rounded posteroventrally; telsonic apex slightly convex, major setae broken off but sockets of setae indicating medium size.

REMARKS.—Mouthparts similar to those figured herein for *M. necopinus*, new species, except for maxilliped; inner plate with one of ter-

minal setae shortened and spinelike; maxillipedal palp article 4 shorter than that of *M. necopinus*.

Holotype.—AHF No. 6112, male, 6.4 mm. Unique.

Type-locality.—Station 7231, 27°24′00″ N, 115°12′15″ W, 2398–2475 m, Jan. 1, 1961.

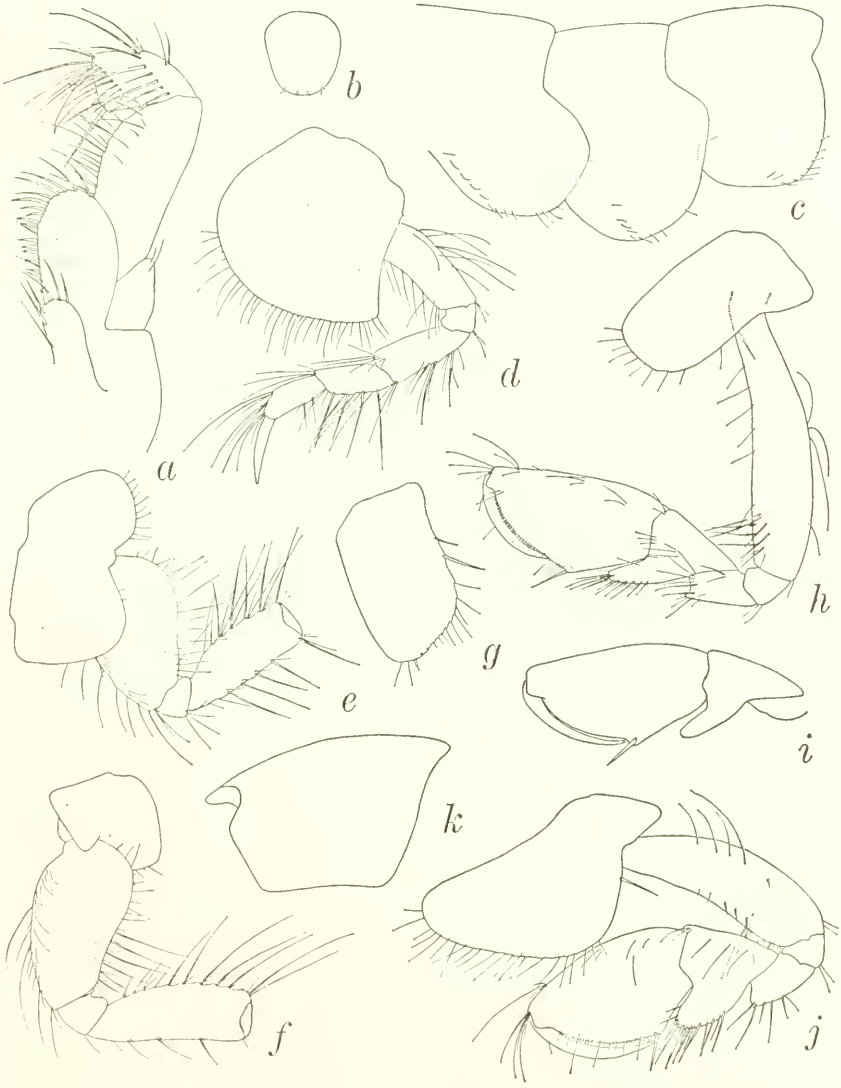


Figure 55.—*Monoculodes recandesco*, new species, holotype, male, 6.4 mm, 7231: *a*, maxilliped; *b*, telson, showing apical sockets of missing spines; *c*, pleonal epimera 1–3, left to right; *d–f*, pereopods 2,3,4, some broken; *g*, coxa 3; *h,i*, gnathopod 2; *j*, gnathopod 1; *k*, head, left lateral.

Relationship.—This species resembles *Monoculodes necopinus*, new species, but the gnathopodal hands are more strongly expanded, the posterior lobe of article 5 on gnathopod 2 is shorter, the head is broader, the rostrum shorter, and the posterior lobe of article 5 on gnathopod 1 is more massive. *Monoculodes recandesco* is related to *M. abacus* J. L. Barnard (1961) and *M. latissimanus* Stephensen (1931) but the telson apparently has distal setae and not stout spines, the gnathopodal hands are slightly narrower, the rostrum shorter, and the lateral cephalic lobes are broader than in the other two species. Article 2 of pereopod 3 is more strongly expanded in *M. latissimanus* than it is in *M. recandesco*.

A resemblance is shown to *M. diamesus* Gurjanova (see 1951) but the posterior lobe of article 5 of gnathopod 1 is broader and scarcely notched at the distal base in *M. recandesco*, the rostrum is shorter and the lateral cephalic lobe is very broad, truncate, and not acutely produced. *Monoculodes semenovi* Gurjanova (see 1951) bears eyes, the rostrum is longer, the lateral cephalic lobe narrower and less fully incorporated in the head, and article 6 of gnathopod 2 is broader than in *M. recandesco*.

Monoculodes (?) *sudor*, new species

Figure 56

Diagnosis.—Eyes absent; rostrum long, slender, straight, acute, reaching to apex of article 1 of antenna 1; lateral cephalic lobe with subacute apex, lobe compressed slightly dorsalwards; antenna 2 scarcely longer than antenna 1, both antennae slender and lacking large spines, peduncles strongly setose, setae not plumose; peduncular article 2 of antenna 1 longer than article 1; posterior lobes on fifth articles of gnathopods short, not massive, slightly geniculate, thus pointing slightly distalwards, about equally developed on both pairs of gnathopods; gnathopods relatively slender for the genera *Oediceroides* and *Monoculodes*, intersimilar, gnathopod 2 slightly longer than 1, fourth articles with slight posterodistal protuberances, subacute on gnathopod 2; dactyls of pereopods 1 and 2 slightly longer than sixth articles; gnathopodal hands not strongly expanded, palms and posterior margins of sixth articles equal; coxa 4 very large, broad, slightly longer than anterior coxae, posterior edge slightly oblique, nearly straight, posteroventral corner sharply quadrate and slightly extended posteriorly; coxa 1 large, strongly extended forward; article 2 of pereopod 5 evenly tapering distally, posteroventral corner scarcely pro-

jecting from tangent of article 3; posteroventral corners of pleonal epimera rounded; dorsum of pleon very minutely tuberculate and covered with down; telson rounded apically. Uropod 3 missing.

HOLOTYPE.—AHF No. 6118, female, 11.0 mm. Unique.

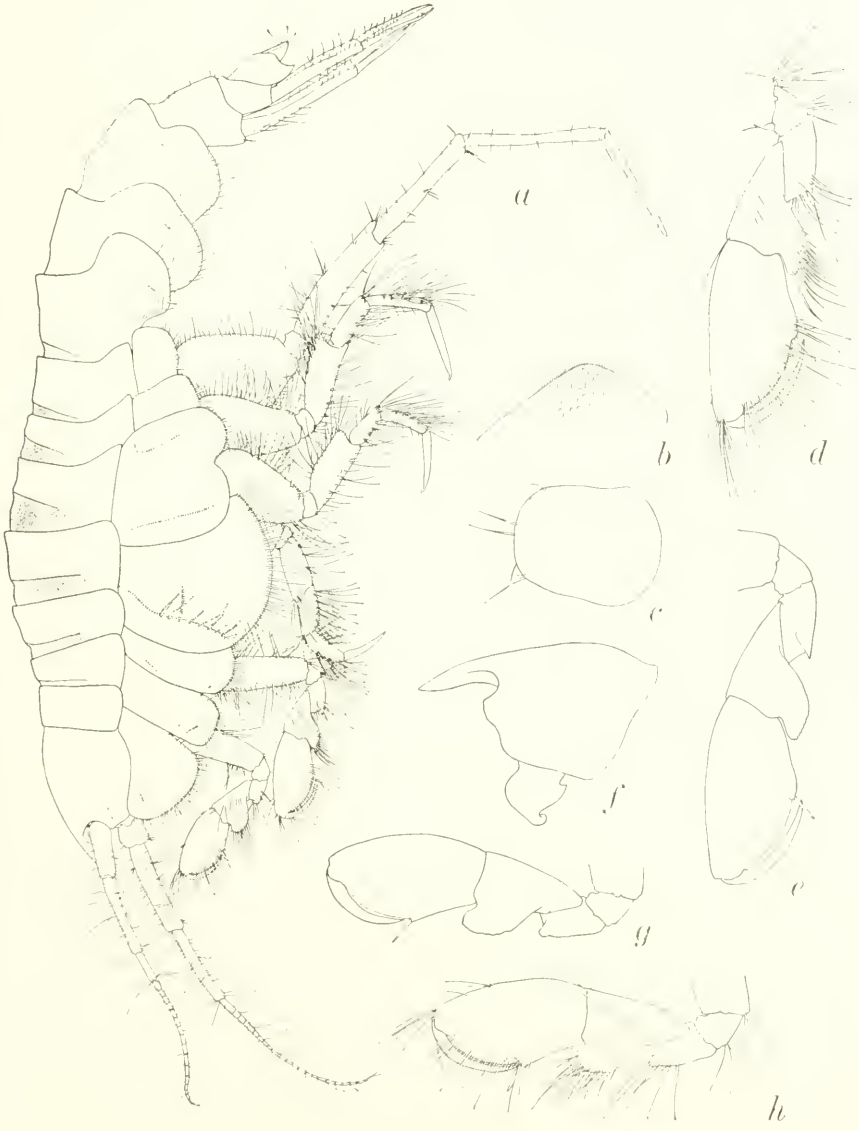


FIGURE 56.—*Monoculodes* (?) *sudor*, new species, holotype, female, 11.0 mm, 7234: *a*, lateral aspect; *b*, dorsal enlargement of pleonite 3 to show "down" and tuberculations; *c*, telson; *d,e*, gnathopod 2; *f*, head; *g,h*, gnathopod 1.

Type-locality.—Station 7234, 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

Relationship.—The generic position of this species is not clear; its gnathopods have aspects of the genus *Oediceroides* Stebbing but its second antenna is neither enlarged nor distinctly spinose as in that genus. Except for its gnathopods, which have poorly developed lobes on the posterior margins of the fifth articles and which do not guard the sixth articles, this species might be assigned to *Monoculodes* Stimpson; it would join taxa such as *Monoculodes latissimanus* Stephensen (1931), which also has poorly developed posterior lobes. *Monoculodes sudor* intergrades *Oediceroides* and *Monoculodes* by virtue of its gnathopods while *Monoculodes kroyeri* Boeck intergrades the two genera in its intermediate second antenna. Those facts, however, are not conclusive evidence that the two genera should be merged.

Monoculodes sudor is assigned to *Monoculodes* mainly on the condition of antenna 2. In that genus it bears comparison to *M. glyconica* J. L. Barnard (1962d), a sympatriot having distinct eyes, a slightly shorter second peduncular article on antenna 1, a broader, less quadrate lateral cephalic lobe, a more weakly produced posterior lobe on article 5 of gnathopod 1 and a slightly more strongly produced lobe on gnathopod 2. *Monoculodes scabriculosus* K. H. Barnard (1932) differs from *M. sudor* in the same ways that *M. glyconica* does.

Monoculodes sudor resembles several species in the genus *Oediceroides*. It is close to *O. antennatus* K. H. Barnard (1937) because the second peduncular article of antenna 1 is longer than the first, a character otherwise unique to *O. antennatus* in the genus *Oediceroides*. But *M. sudor* has a much longer first antenna than that described for *O. antennatus*.

Except for antenna 1 and its second article, *M. sudor* is similar to *O. limpieza* J. L. Barnard (1961) but differs from it by the terminally rounded, not excavate telson. *Monoculodes sudor* differs from *O. plumicornis* K. H. Barnard (1925) in the absence of plumosities on the first antennal setae and the relative equality of the antennae. From *O. proximus* Bonnier (1896), which it resembles in the minutely tuberculate dorsum of the pleon, covered with down, *M. sudor* differs in its first antenna and the weaker posterior lobe of article 5 on gnathopod 2.

Oediceroides wolffi J. L. Barnard (1961) has a shorter rostrum and bulkier posterior processes on article 5 of gnathopod 2 than does *M. sudor*. The rostrum of *O. weberi* Pirlot (1932) is more downturned and the gnathopodal lobes are longer than in *M. sudor*.

Oediceroides Stebbing, new synonymy

Oediceroides Stebbing, 1888, p. 843; 1906, pp. 267–268.
Oediceropsoides Shoemaker, 1925, p. 27.

There are no significant generic characters distinguishing Shoemaker's *Oediceropsoides* from *Oediceroides* Stebbing and the two are synonymized.

Oediceroides abyssorum (Shoemaker), new combination

FIGURE 52 *d–f*

Oediceropsoides abyssorum Shoemaker, 1925, pp. 27–31, figs. 4–6.

Shoemaker's specimen lacked the last three pleonal segments and their appendages. The specimen at hand has these segments less uropod 3. Uropods 1 and 2 and the telson are illustrated here. The rostrum is very slightly less obtuse than that described by Shoemaker.

MATERIAL.—Station 7229, figured female, 17.5 mm and one other specimen.

DISTRIBUTION.—Recorded by Shoemaker from east of Guadalupe Island, off Baja California, 1606 m; recorded here from a depth of 1720 m.

Oediceropsis Liljeborg

Oediceropsis (Paroediceroides) ?morosa J. L. Barnard

Oediceropsis (Paroediceroides) morosa J. L. Barnard, 1966a, p. 79, fig. 32.

MATERIAL.—Station 7249 (? 1 anterior fragment).

DISTRIBUTION.—Southern California to ?middle Baja California, 813 to ?3705 m.

Paramphithoidae

Amathillopsis Heller

Amathillopsis pacifica margo, new subspecies

FIGURES 57, 58

DIAGNOSIS.—Posterodistal lobe of article 2 on gnathopod 1 as strongly produced as on gnathopod 2; tooth of third pleonal epimeron smaller than in the nominate form; second pleonal epimeron with a distinct posterodistal tooth.

HOLOTYPE.—Copenhagen Museum, female, 20 mm. Unique.

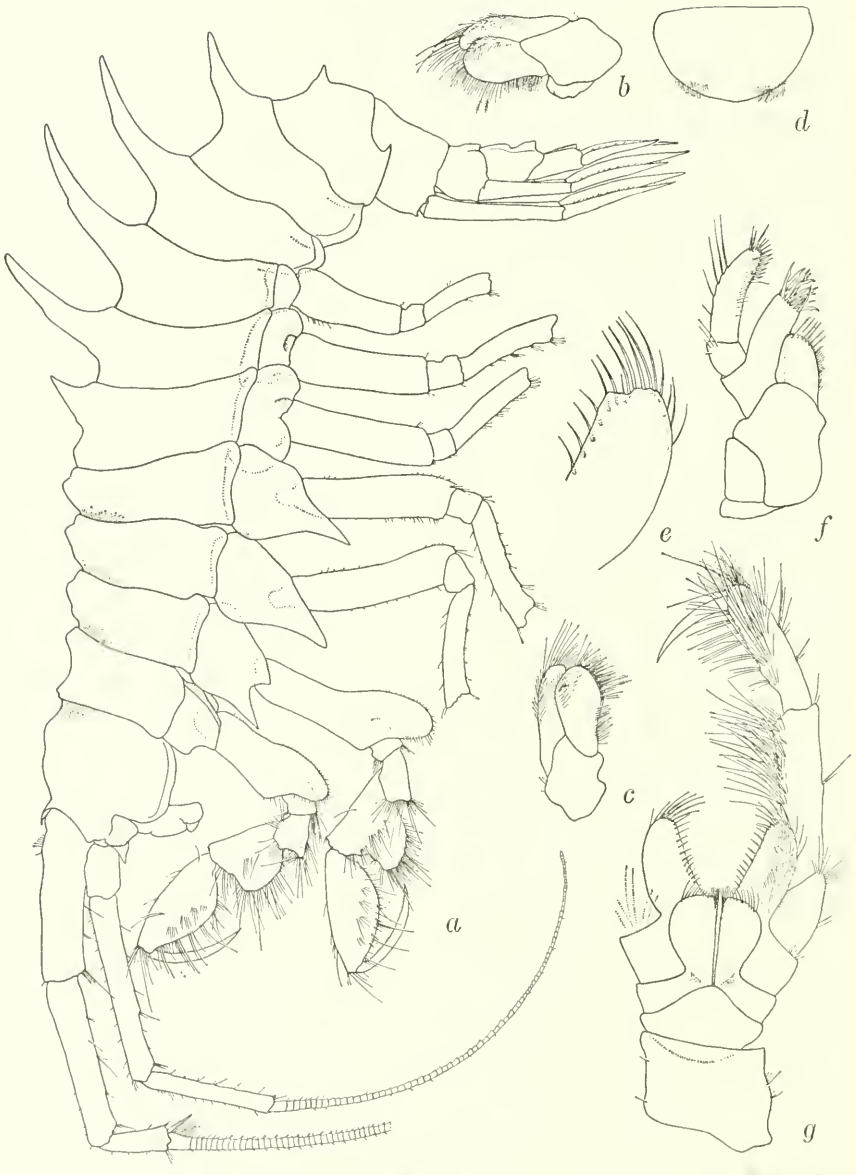


FIGURE 57.—*Amathillopsis pacifica margo*, new subspecies, holotype, female, 20.0 mm, Baja Slope Expedition Sta. P 285–61: *a*, lateral aspect, pereopods broken terminally; *b*,*c*, maxilla 2; *d*, upper lip; *e*, outer plate of maxilliped, flattened; *f*, maxilla 1; *g*, maxilliped.

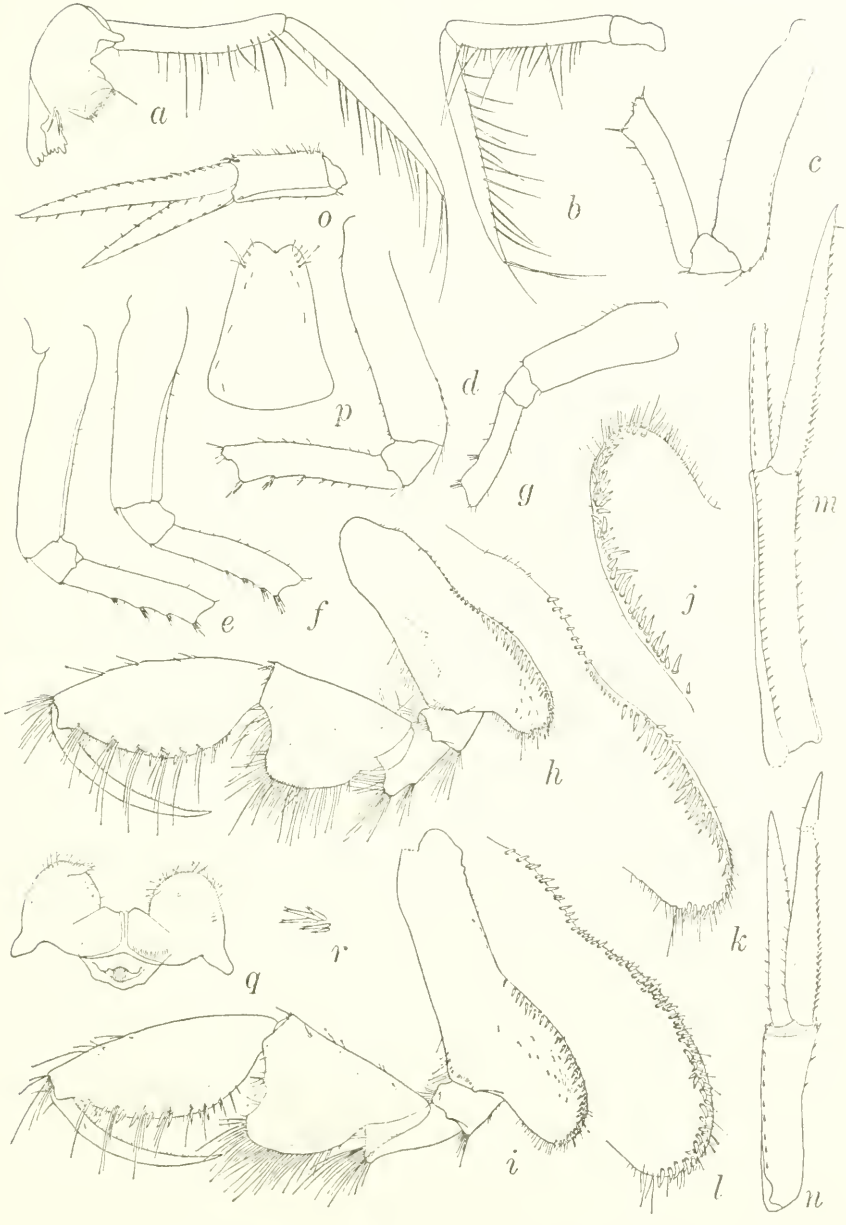


FIGURE 58.—*Amathillopsis pacifica margo*, new subspecies, holotype, female, 20.0 mm, Baja Slope Expedition Sta. P 285–61: *a*, mandible; *b*, mandibular palp; *c–g*, pereopods 1,2,3,4,5, minus coxae and terminal articles; *h,i*, gnathopods 1,2, lateral; *j*, medial view of posterodistal process on article 2 of gnathopod 2; *k,l*, lateral and medial views of posterodistal process of article 2 on gnathopod 1; *m–o*, uropods 1,2,3; *p*, telson; *q*, lower lip; *r*, mediodistal spine group of peduncle on uropod 3.

Type-locality.—Baja Slope Expedition P285–61, 23°59.5′ N, 113°11.9′ W, 3481–3518 m, Mar. 5, 1961.

Remarks.—The distinctions attributed to this specimen in comparison with the type figures of Gurjanova (1955, pp. 209–212, fig. 19) are not of the same magnitude as those differences used to distinguish the seven known species of the genus. The dorsal teeth, coxae, gnathopods (in respects other than in the diagnosis), and head are all very much like those of *A. pacifica*, which was collected from the Okhotsk Sea in 2850 m.

Pardaliscidae

Pardalisca Krøyer

Pardalisca species

Figures 59, 60

This specimen resembles *Pardalisca tenuipes* Sars (1895, pl. 142, fig. 2) and *P. marionis* Stebbing (1888). The mouthparts of *P.*

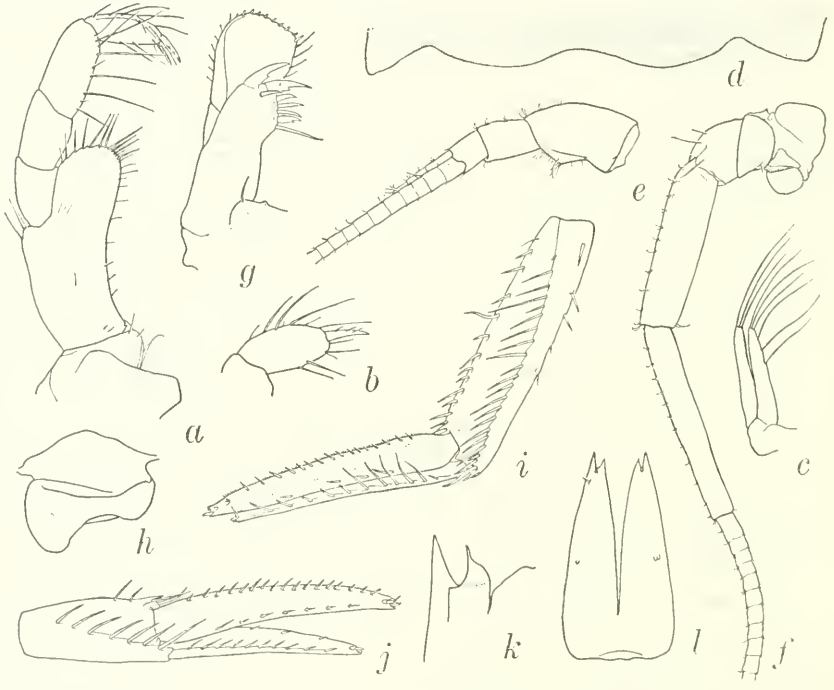


Figure 59.—*Pardalisca* species, female, 8.8 mm, 7229: *a*, maxilliped; *b*, articles 3 and 4 of maxillipedal palp flattened; *c*, maxilla 2; *d*, dorsal margin of pleonite 3; *e,f*, antennae 1,2, flagella cut off; *g*, maxilla 1; *h*, labrum; *i,j*, uropods 1,2, a few missing spines of rami restored; *k*, mediodistal end of peduncle of uropod 2 showing sculpture; *l*, telson.

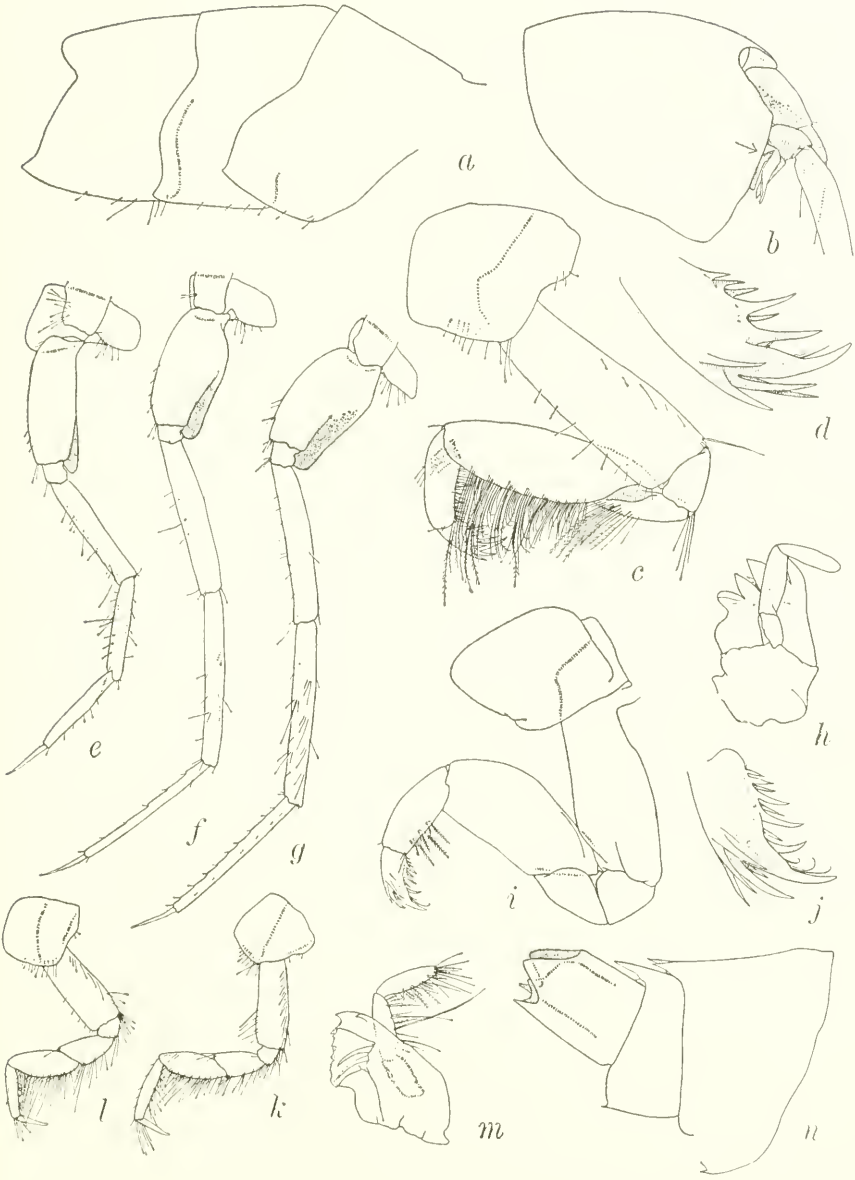


FIGURE 60.—*Pardalisca* species, female, 8.8 mm, 7229: *a*, pleonal epimera 1–3, right to left; *b*, head with bases of antennae 1,2 and arrow pointing to apex of epistome-labrum complex; *c,d*, gnathopod 2 and dactyl; *e–g*, pereopods 3 (pulled away from coxa), 4,5; *h*, left mandible, outer surface, setae removed from palp; *i,j*, gnathopod 1 and dactyl; *k,l*, pereopods 1,2; *m*, right mandible; *n*, pleonites 4–6, right to left, lateral.

tenuipes have not been described and the differences of the buccal pieces of the specimen at hand from those of *P. cuspidata* Krøyer (Sars, 1895, pl. 141) indicate that the mouthparts of *P. tenuipes* may also differ from those of *P. cuspidata* and *P. marionis*. Most of the posterior end of *P. marionis* has not been described. The specimen at hand differs from *P. tenuipes* mainly in the absence of eyes but the length of article 6 on gnathopod 1 appears to be relatively shorter in *Pardalisca* species than in *P. tenuipes*. There are slight differences in the proportions of various articles of the pereopods of the two species. Uropod 3 is missing on the specimen at hand and the right mandible resembles that of *P. marionis* more than that of *P. cuspidata* because of the presence of two large submarginal spines. Maxilla 2 resembles that of *P. cuspidata* more than that of *P. marionis*.

Material.—Station 7229, female, 8.8 mm.

Pardaliscopsis Chevreux

Pardaliscopsis (?) *copal*, new species

Figures 61, 62

Diagnosis.—Upper lip short, broad, medially notched, lobes shallow and nearly symmetrical; rostrum small, distinct, blunt, lateral cephalic lobes massive, mammilliform; right mandible with three large blunt teeth, one bifid, lacinia mobilis bifid, one spine in spine row and a setose ridge occurring proximal to it; left mandible with four minute distal protuberances, lacinia mobilis broad, minutely serrate, two spines in spine-row with setose ridge proximal to spines; mandibular palp long, article 3 longer than 2, apically setose; lower lip like that of *Pardaliscella boecki* (Malmgren) (in Sars, 1895, pl. 143, fig. 2); inner plate of maxilla 1 not discovered, otherwise like *P. boecki;* lobes of maxilla 2 broad and short; maxilliped like that of *P. boecki* but dactyl elongate; coxae 1–4 elongate, quadrate, coxa 5 large, not bilobed, ovotriangular, coxa 6 small, slightly bilobed, posteroventral corner with small tooth, coxa 7 small, short, broad, with small posteroventral notch and seta; gnathopods like those of *Halice* Boeck, fifth articles medium in length, distinctly separated from adjoining articles, posteriorly truncate and trapezoidal in outline, sixth articles slightly longer than fifth, tapered distally, slightly concave posteriorly, posterior margins bearing stout, biplumose spine-setae, dactyls long, nearly three fourths as long as sixth articles; pereopods 1 and 2 with dactyls as long as

sixth articles, fourth and fifth articles of medium expansion; second articles of gnathopods and pereopods 1 and 2 attached nearly at proximal margins of coxae; pereopods 3 and 5 remarkably interdistinct in size and length, pereopod 3 short, article 2 slender, pereopod 4 long,

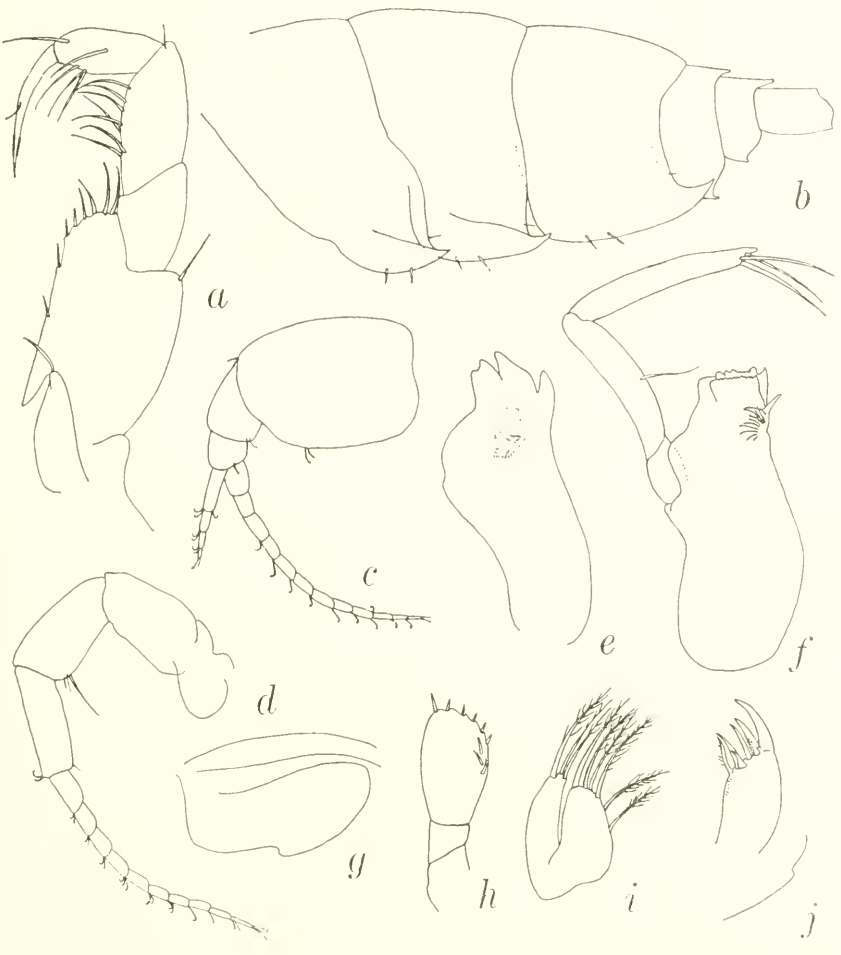


FIGURE 61.—*Pardaliscopsis* (?) *copal*, new species, holotype, female, 4.4 mm, 7231: *a*, maxilliped; *b*, pleon, left; *c,d*, antennae 1,2; *e*, right mandible, outer surface; *f*, left mandible; *g*, labrum; *h*, palp of maxilla 1; *i*, maxilla 2; *j*, outer lobe of maxilla 1.

article 2 slender; pereopod 5 long, article 2 expanded, ovoid, unornamented and rounded posteriorly; pleonites 4 and 5 each with small, acute posterodorsal tooth, pleonal epimera 1–3 each with large posteroventral acute tooth slightly upturned, epimera 1 and 2 with lateral

ridge delineating tooth, posterior margins of epimera decreasingly convex consecutively; uropods 1 and 2 each with equal rami, uropod 3 damaged, outer ramus apparently bi-articulate; telson cleft about half its length.

HOLOTYPE.—AHF No. 6134, female, 4.4 mm. Unique.

FIGURE 62.—*Pardaliscopsis* (?) *copal*, new species, holotype, female, 4.4 mm, 7231: *a,b*, gnathopods 1,2; *c*, head; *d–g*, pereopods 1,3,4,5; *h–j*, uropods 1,2,3; *k*, telson; *l*, coxa 4.

Type-locality.—Station 7231, 27°24′00″ N, 115°12′15″ W, 2398–2475 m, Jan. 1, 1961.

Relationship.—This species fits the diagnosis of *Pardaliscopsis* Chevreux (1911) except for the symmetrical lobes of the upper lip and the broad lobes of maxilla 2. It might be assigned to *Pardaliscella* Sars except for the broad second maxillae and the occurrence of dorsoposterior teeth on pleonites 4 and 5, the lack of which Birstein and Vinogradov (1962) use as a character for distinguishing *Pardaliscella* from *Halice* Boeck. The species at hand differs from *Halice* in the toothed mandibles, and from *Pardaliscoides* Stebbing by the short fifth and long sixth articles of the gnathopods and the short second article of antenna 1. Otherwise the mouthparts of *Pardaliscopsis copal* resemble those of *Pardaliscoides*.

The combination of toothed mandibles, symmetrically lobed upper lip, short article 2 of antenna 1, toothed pleonites 4 and 5, cleft telson, halice gnathopods, and stout second maxillae may warrant the erection of a new genus for *P. copal*.

Pardaliscopsis (?) *tikal*, new species

Figures 63, 64

Diagnosis of female.—Similar in its generic characters to *Pardaliscopsis* (?) *copal* described above; differing from that species in deeper incision of upper lip, in broader head with more strongly rounded and less projecting lateral cephalic lobes; accessory flagellum 5-articulate, terminal article very small; mandibles similar but right with four distinct teeth on cutting edge; spines of outer plate of maxilliped larger, dactyl of maxillipedal palp shorter than in *P.* (?) *copal;* coxa 5 with slightly sinuous ventral margin; gnathopods with sixth articles scarcely tapering distally, article 5 of gnathopod 1 shorter, of gnathopod 2 equal to article 6; pereopod 4 with article 2 slightly broader than in *P.* (?) *copal;* uropod 3 with article 2 of outer ramus very short; pleonal epimeron 3 with posterior margin convex and posteroventral corner rounded; pleonite 4 dorsally bidentate, 5 unidentate.

Male.—Antenna 1 with bases of flagellum and accessory flagellum each conjoint, broken apically; pleonite 5 with dorsal tooth elongate; uropods 1 and 2 better preserved than in female and showing four marginal spines on outer ramus of uropod 1, and two marginal and four small submarginal spines on outer ramus of uropod 2. Length, 4.0 mm.

Holotype.—AHF No. 6033, female, 4.1 mm.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720 1748 m, Dec. 31, 1960.

Material.—Six specimens from the type-locality.

Remarks.—This species differs from *P.* (?) *copal* primarily in the shape of the third pleonal epimeron but also differs in the outline of coxa 5, the maxilliped and in minor ways the gnathopods and pereopods.

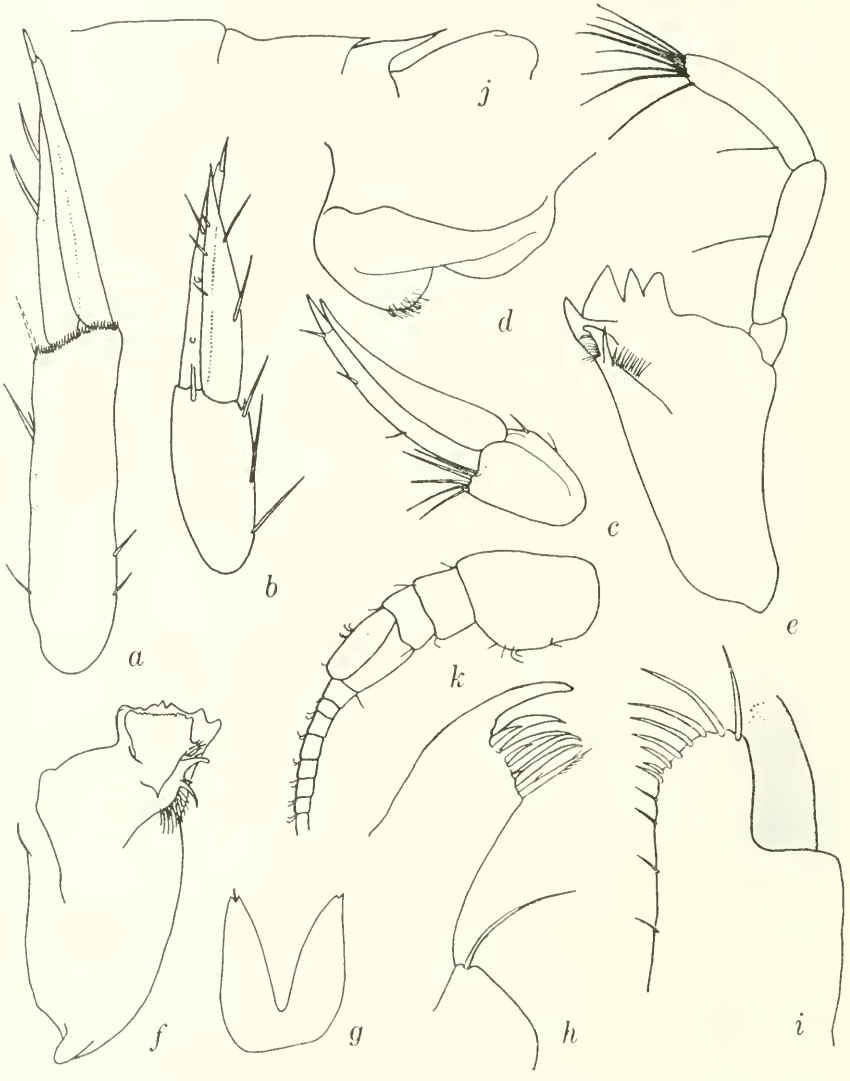


Figure 63.—*Pardaliscopsis* (?) *tikal*, new species, holotype, female, 4.1 mm, 7229: *a*, uropod 1, ventral view, outer ramus to right; *b*, uropod 2, damaged, inner ramus to right; *c*, uropod 3; *d*, labrum; *e,f*, mandibles; *g*, telson; *h*, inner and outer plates of maxilla 1; *i*, outer plate of maxilliped. Male, 4.0 mm: *j*, dorsal outline of pleonites 3,4,5,6, left to right; *k*, antenna 1, distal articles of both flagella missing.

An inner lobe of the first maxilla has been observed and figured; the outer lobe and palp are similar to those of *P.* (?) *copal*, as is the second maxilla.

FIGURE 64.—*Pardaliscopsis* (?) *tikal*, new species, holotype, female, 4.1 mm, 7229: *a*, head; *b*, antenna 1, medial; *c–e*, coxae 1,2,4; *f–i*, percopods, 1,3,4,5; *j,k*, gnathopods 1,2; *l*, palp articles 3,4 of maxilliped; *m*, pleonites 1–6, right to left, upper offset showing dorsal view of two teeth of pleonite 4.

Pardisynopia J. L. Barnard

Pardisynopia synopiae J. L. Barnard

Pardisynopia synopiae J. L. Barnard, 1962b, pp. 77–78, figs. 3, 4; 1964c, pp. 235–236; 1966a, p. 81.

MATERIAL.—Stations 7229 (?1), 7234 (1).

DISTRIBUTION.—Monterey Bay, California to middle Baja California, 52–1720 m.

Tosilus J. L. Barnard

Tosilus arroyo J. L. Barnard

FIGURE 65

Tosilus arroyo J. L. Barnard, 1966a, p. 82, fig. 35.

This specimen is in better condition than the holotype and several parts are reillustrated herein. The head is in good condition; its lateral lobes are of unusual form for a pardaliscid as shown in the figure and are not distinct from the remainder of the head anteroventrally; the rostrum is of medium size, blunt, and is ventrally marked

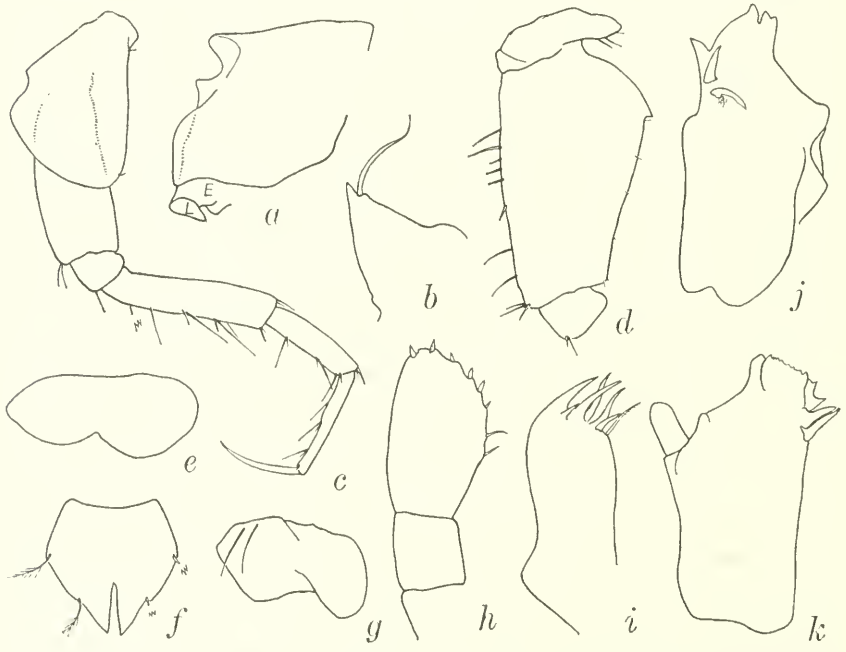


FIGURE 65.—*Tosilus arroyo* J. L. Barnard, female, 5.5 mm, 7358: *a*, head (E=epistome, L=labrum); *b*, inner plate of maxilla 1; *c,d* , pereopods 3,5; *e*, labrum, anterior view; *f*, telson; *g*, coxa 6, medial, right side; *h*, palp of maxilla 1; *i*, outer lobe of maxilla 1; *j,k*, right and left mandibles, palps removed.

by a broad sinus, below which occurs a subconical keel on the dorsoventral midaxis of the head, below which the keel extends ventrally between the cephalic lobes to meet the modified upper lip.

MATERIAL.—Station 7358, female, 5.5 mm.

DISTRIBUTION.—Southern California to middle Baja California, 976–1095 m.

Phoxocephalidae

Harpiniopsis Stephensen

Harpiniopsis emeryi J. L. Barnard

Harpiniopsis emeryi J. L. Barnard, 1960b, p. 334, pl. 69; 1966a, p. 84.

MATERIAL.—Stations 7229 (1), 7231 (3).

DISTRIBUTION.—Southern California to middle Baja California, 344–2702 m.

Harpiniopsis epistomata J. L. Barnard

Harpiniopsis epistomatus J. L. Barnard, 1960b, pp. 326–328, pls. 62, 63.
Harpiniopsis epistomata J. L. Barnard, 1966a, p. 85.

MATERIAL.—Stations 7234 (3), 7235 (1), 7358 (7).

DISTRIBUTION.—Southern California to middle Baja California, 371–1626 m.

Harpiniopsis excavata (Chevreux)

Harpinia excavata Chevreux, 1887, pp. 3–5; 1900, pp. 37–38, pl. 6, fig. 1.—Stebbing, 1906, pp. 142–143; 1908, pp. 73–74; 1910, p. 452.—K. H. Barnard, 1925, pp. 340–341.—Chevreux, 1927, p. 73; 1935, p. 74.—Schellenberg, 1955, p. 193.—J. L. Barnard, 1960b, p. 353; 1962a, pp. 47–50, figs. 37, 38; 1964b, pp. 18–21, fig. 16.
Harpiniopsis sanpedroensis J. L. Barnard, 1960b, pp. 328–330, pls. 64, 65.
Harpiniopsis excavata.—J. L. Barnard, 1966a, p. 85.

A specimen 13.0 mm long from 7229 has a long tooth on pleonal epimeron 3 like the figures of Barnard (1962a) and Barnard (1960b, =*H. sanpedroensis*). It is the largest known specimen of the species and is exceedingly setose; for example, it has 20 setae on the outer ramus of uropod 2 and 15 setae on the expanded anterodistal edge of article 2 on pereopod 5. The proximal end of article 2 of pereopod 4 has a distinct, nasiform posterior cusp just at the juncture with the coxa.

One of the specimens of 7228 has the gland-cone of antenna 2 poorly developed.

Harpiniopsis excavata and *H. abyssalis* Pirlot (1932) are very similar and may be difficult to distinguish in juvenile stages because the disproportionate swelling and addition of setae along the anterodistal margin of article 2 on pereopod 5 in *H. excavata* presumably develops

from a simple condition similar to that of *H. abyssalis*. All of the specimens at hand, however, have at least two long setae at that location and are recognizable as *H. excavata*, but juveniles have not been captured because of the coarseness of the sorting screens. Both *H. excavata* and *H. abyssalis* are characterized by the large, apically blunt gland-cone of antenna 2.

Material.—Stations 7228 (2), 7229 (3), 7230 (3), 7231 (1), 7235 (1).

Distribution.—Midlatitudes of the Atlantic Ocean and eastern Pacific Ocean, 425–5110 m.

Harpiniopsis fulgens J. L. Barnard

Harpiniopsis fulgens J. L. Barnard, 1960b, p. 332, pls. 67, 68; 1966a, p. 85.

All of these specimens have the long tooth of pleonal epimeron 3 shown by Barnard (1960b, pl. 68). The largest specimen is a female, 10.5 mm, from 7229; the specimens of that sample have a slightly narrower article 2 of pereopod 5 than that shown by Barnard (1960b, pl. 67). Possibly the populations with the long epimeral tooth should be relegated to infraspecific status because their gnathopods are considerably larger than those of the type-form.

This species is very similar to *H. similis* Stephensen (1925) but differs by the presence of spines on the rami of uropods 1 and 2 and the much longer article 6 of pereopod 4.

Material.—Stations 7229 (5), 7230 (1), 7231 (1), 7358 (1).

Distribution.—Southern California to middle Baja California, 128–2667 m.

Harpiniopsis naiadis J. L. Barnard, variant

Figure 52 *g*, *h*

Harpiniopsis naiadis J. L. Barnard, 1960b, pp. 336–339, pl. 73; 1966a, p. 85.

The third pleonal epimeron differs from the type figures as shown in the accompanying illustration and the second article of the outer ramus of uropod 3 is relatively shorter but all other characters are similar to those of the type.

Material.—Station 7229 (4), 7231 (1).

Distribution.—Southern California to middle Baja California, 338–2398 m.

Harpiniopsis petulans J. L. Barnard

Harpiniopsis petulans J. L. Barnard, 1966a, p. 86, fig. 39.

Material.—Station 7229 (4).

Distribution.—Southern California to middle Baja California, 1265–1720 m.

Harpiniopsis profundis J. L. Barnard

Harpiniopsis profundis J. L. Barnard, 1960b, p. 330, pl. 36; 1966a, p. 86.

Specimens from 7358 and 7229 have the tooth of pleonal epimeron 3 slightly longer and more upturned than shown in the type-figures. The tooth is similar to that shown by Barnard (1960b, pl. 64, fig. N) for *H. sanpedroensis* (=*H. excavata* Chevreux). Otherwise the specimens correspond to Barnard's figures in the shortness of the outer ramus of uropod 2 and in the shape of pereopod 5.

A specimen from 7231 has a slightly sinuous ventral margin on the third pleonal epimeron and one spine on the inner ramus of uropod 1. Another specimen from 7231 is similar to that already mentioned but the posterior teeth of pereopod 5 are larger than in the variety of *H. profundis* described by Barnard (1966a) and shorter and broader than in typical *H. profundis*. Juveniles of *H. profundis* lack spines on the inner rami of uropod 1, have small teeth on article 2 of pereopod 5 and a straight ventral margin of pleonal epimeron 3.

Material.—Stations 7229 (2 variants), 7231 (3 typical and 5 variants), 7235 (4), 7358 (6).

Distribution.—Southern California to middle Baja California, 385–2398 m.

Leptophoxus Sars

Leptophoxus falcatus icelus J. L. Barnard

Leptophoxus falcatus icelus J. L. Barnard, 1960b, pp. 308–311, pls. 53, 54; 1966a, p. 87.

Material.—Station 7234 (4).

Distribution.—Southern California to middle Baja California, 248–1120 m.

Metaphoxus Bonnier

Metaphoxus simillimus, new species

Figure 66

Diagnosis.—Eyes absent; head elongated (as in *Phoxocephalus kergueleni* (Stebbing), 1888), antenna 1 with anterodorsal process on article 1 (as in *P. kergueleni*); article 3 of mandibular palp slender, lateral margins parallel, apex narrow (maxilla 1 like that of *Phoxocephalus homilis* J. L. Barnard (1960b), maxillipeds like those of *P. homilis*, inner plates broad, with two short spines (in contrast to *Metaphoxus frequens* J. L. Barnard, 1960b, which has long spines and

FIGURE 66.—*Metaphoxus simillimus*, new species, holotype, female, 5.6 mm, 7230: *a*, head and antenna 2; *b*, mandibular palp; *c*, right mandible, outer view; *d*, left mandible, inner view; *e*, maxilliped; *f*, maxilla 2; *g–j*, pereopods 1,3,4,5; *k–m*, uropods 1,2,3; *n*, half of telson; *o,p*, gnathopods 1,2, medial; *q*, coxa 4; *r*, lower lip, broken at left; *s*, distal end of pereopod 2; *t*, pleonal epimera 1–3, left to right, 3 broken anteriorly.

narrow, elongated lobes)); gnathopods with stout hands (like those of *P. kergueleni*), hands less than 1.5 times as long as wide, palms oblique, convex, each defined by one large spined cusp; article 7 of pereopod 5 slender, as long as article 6; coxa 4 subquadrate, ventral margin parallel with dorsal surface of body, posterior cusp well defined, posteroventral edge scarcely oblique, nearly vertical; pleonal epimera with rounded posteroventral corners, epimeron 3 with strongly convex posterior margin; outer ramus of uropod 1 about three fourths as long as inner, curved apically, dorsal and lateral margins unarmed, bearing one mediobasal spine, inner ramus broad, apex falcate, armed with marginal and terminal setae; rami of uropod 2 elongate, longer than peduncle, smooth basally, outer ramus armed with one terminal seta, inner with three; telson poorly preserved, each apex with at least one spine.

Holotype.—AHF No. 6034, female, 5.6 mm. Unique.

Type-locality.—Station 7230, 27°52′25″ N, 115°44′30″ W, 2667–2706 m, Dec. 31, 1960.

Relationship.—This species has its closest affinities with *Metaphoxus pectinatus* (Walker, 1896) and differs from *M. fultoni* (Scott) (see Chevreux and Fage, 1925) in its gnathopods and from *M. frequens* J. L. Barnard (1960b) by its maxillipeds, among other characters. It resembles several species of *Phoxocephalus* more closely than it does members of *Metaphoxus* but the vestigial mandibular molar marks it as a species of *Metaphoxus*. The new species differs from *M. pectinatus* in the stout hand of the first gnathopod, by the reduction in size and length of the outer ramus of uropod 3, the presence of terminal setae on the rami of uropod 2, the absence of eyes and the more strongly quadrate coxa 4 with its more strongly defined posterior cusp. *Metaphoxus simillimus* and *M. pectinatus* resemble two species of deep-sea *Phoxocephalus*, *P. kergueleni* (Stebbing, 1888) and *P. tenuipes* Stephensen (1925) in the elongation of pereopod 5 but *M. simillimus* is even more similar to *P. kergueleni* than is *M. pectinatus* because of the occurrence of a modified outer ramus of uropod 1. *Phoxocephalus tenuipes*, from the north Atlantic bathyal, has equal rami on uropod 1. The resemblance of *Metaphoxus simillimus* to *P. kergueleni* is remarkable, even to the similarity of antenna 1 and its anterodorsal process on article 1. Except for the absence of eyes it also resembles a shallow-water sympatriot *Phoxocephalus homilis* J. L. Barnard (1960b). *Metaphoxus simillimus* differs from both *P. kergueleni* and *P. homilis* by the presence of terminal setae on the outer rami of uropod 2 and the absence of setae on the ventral margin

of pleonal epimeron 2. It bears little similarity to its sympatric congener, *M. frequens*, because of numerous maxillipedal and uropodal differences.

Paraphoxus Sars

Paraphoxus oculatus (Sars)

Phoxus oculatus Sars, 1879, p. 441.

Paraphoxus oculatus.—Sars, 1895, pp. 149–150, pl. 51.—J. L. Barnard, 1960b, pp. 240–243, pls. 27, 28 (with synonymy); 1966a, p. 89.

Material.—Stations 7229 (1), 7231 (2), 7234 (2).

Distribution.—Apparently occurring throughout the northern hemisphere and recorded from South Africa, 27–2398 m, submerging in low latitudes, not shallower than 239 m in the Californias.

Phoxocephalus Stebbing

Phoxocephalus kergueleni (Stebbing)

Figure 67

Phoxus kergueleni Stebbing, 1888, pp. 816–819, pl. 55.

Phoxocephalus kergueleni.—Stebbing, 1906, p. 135.—J. L. Barnard, 1960b, p. 300; 1964b, pp. 21–22, fig. 17.

These specimens have the palmar defining tooth of gnathopod 2 larger than in other materials reported in the literature and so may require infraspecific designation. Apparently this species is widespread throughout the bathyal of the southern hemisphere and as far north in the Atlantic Ocean as the Caribbean Sea and in the Pacific Ocean as California. The specimens from 7358 lack spines on the rami of uropod 2 but those of 7229 have them, and thus resemble *P. homilis* J. L. Barnard (1960b), a related species in contiguou shallow water. *Phoxocephalus kergueleni* is distinguished from *P. homilis* in the stouter gnathopod 1 and the shape of gnathopod 2. The specimens from 7229 have the stout first gnathopod but in view of uropod 2 might represent hybrids between the two species. All of the specimens from 7364 and two of the seven from 7358 lack eyes.

Material.—Stations 7229 (5), 7231 (1), 7358 (7), 7364 (1).

Distribution.—Southern hemisphere and midlatitudes of northern hemisphere from 220 m in the subantarctic to 2398 m in midnorth latitudes.

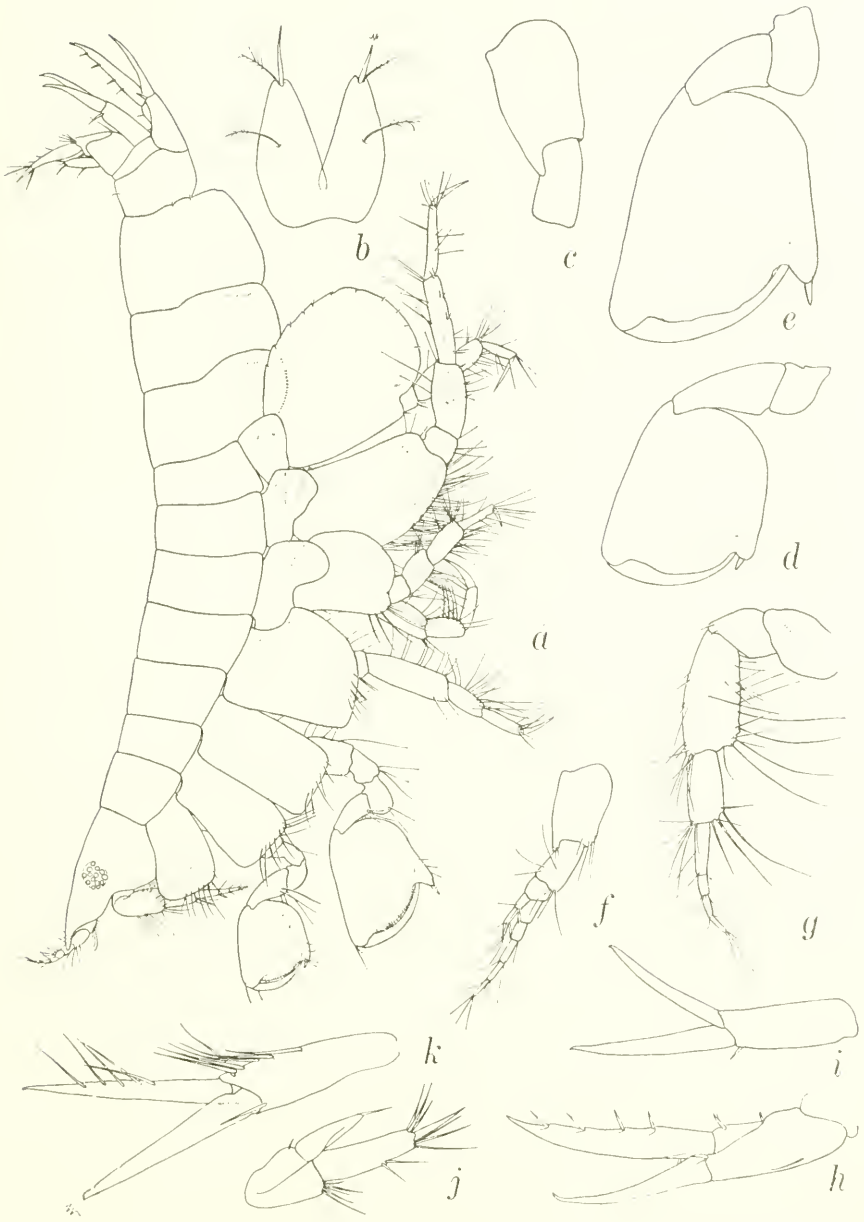


FIGURE 67.—*Phoxocephalus kergueleni* (Stebbing), female, 5.0 mm, 7358: *a*, lateral aspect; *b*, telson; *c*, articles 1,2 of antenna 1 showing dorsodistal process of article 1; *d,e*, distal ends of gnathopods 1,2, minus setae; *f,g*, antennae 1,2; *h–j*, uropods 1,2,3. Dubiously identified specimen, 7229: *k*, uropod 2.

Pleustidae

Mesopleustes Stebbing

Mesopleustes abyssorum (Stebbing)

FIGURE 68

Pleustes abyssorum Stebbing, 1888, p. 872, pl. 67.

Mesopleustes abyssorum.—Stebbing, 1906, p. 315.—Chevreux, 1927, pp. 92–93.—Pirlot, 1933, pp. 155–156.—Schellenberg, 1955, p. 194.—J. L. Barnard, 1964d, p. 321, figs. 4, 5.

A few characters of quantitative extent differentiate this specimen from those previously described. The dorsal carina is more pronounced on the anterior pereonites than in specimens from Marion Island and Japan described by Stebbing (1888) and J. L. Barnard (1964d) but the processes of pleonites 1–3 are blunter. The lateral cephalic lobe is sharper than that from Japan and the pereopodal dactyls are longer than any heretofore described. The rostrum is slightly curved like that of the specimen from Marion Island but not

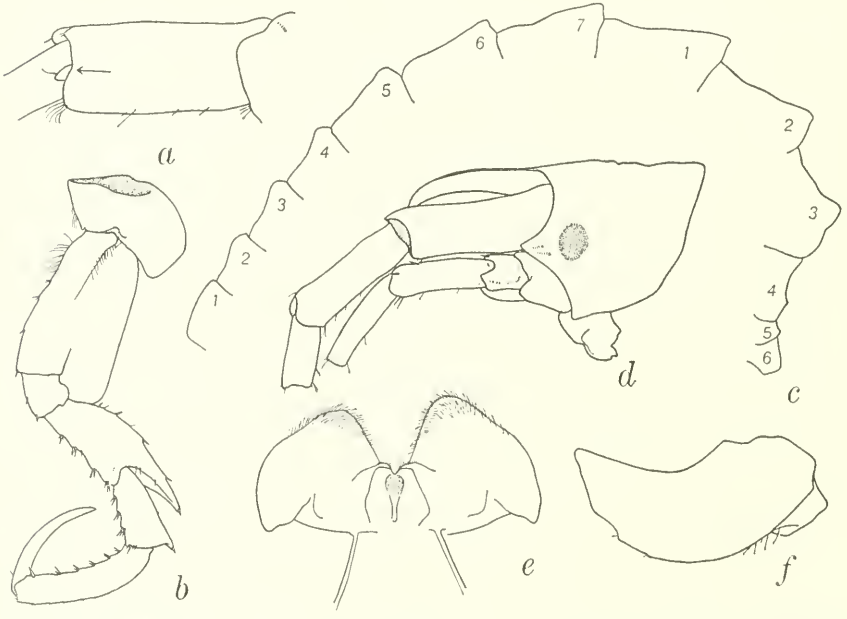


FIGURE 68.—*Mesopleustes abyssorum* (Stebbing), male, 22.0 mm, Baja Slope Expedition Sta. P 285–61: *a*, accessory flagellum marked with arrow on antenna 1; *b*, pereopod 4, medial; *c*, dorsal outline of body, left side, pereonites 1–7 and pleonites 1–6 marked; *d*, head and bases of antennae; *e*, lower lip; *f*, coxa 1.

that from Japan, which is straight. The anteroventral corner of coxa 1 is sharper than that shown by J. L. Barnard (1964d) and that of Stebbing (1888) in his view of the flattened appendage.

The lower lip is illustrated herein to demonstrate the occurrence of weakly developed inner lobes, which Stebbing shows in slightly different form and which are even more weakly developed in J. L. Barnard's (1964d) specimens from Japan. The small accessory flagellum is also enlarged in the drawings.

Material.—Baja Slope Expedition station P 285–61 (1 male, 22 mm long).

Distribution.—Probably cosmopolitan in the deep sea; Marion Island, 3013 m; Cape Noun, Morocco, 1180 m; NW Flores Sea, 694 m; Japan, 1210 m; Baja California, 3479 m.

Stegocephalidae

Parandaniexis Schellenberg

Parandaniexis mirabilis Schellenberg

Figures 69, 70

Parandaniexis mirabilis Schellenberg, 1929, pp. 197–200, pl. 1.

This remarkable species has been recorded only once heretofore, from a specimen 30 mm long collected at a depth of approximately 3700 m, west of Peru on a track between the Galapagos Islands and Easter Island. Two specimens at hand, from southern Baja California in depths of about 3500 m, differ in a few details from the description and figures of Schellenberg. Some of these differences may be the result of differing techniques in illustrating; possibly Schellenberg's illustrator (C. Gomansky) made the drawings freehand; for instance, coxa 4 differs in Schellenberg's plate 1 from the in toto drawing to the dissected drawing. In the figures presented herein the coxae of the in toto drawing are illustrated in their flattened conditions and coxa 4 resembles that shown by Schellenberg on his in toto drawing but not on his presumed flattened view. Coxa 1 and its relationship to pereonite 1 differ strongly in the present specimens, coxa 1 being narrower and attached by a straight juncture to pereonite 1; Schellenberg shows it as much broader and attached to a strongly rounded ventral edge of pereonite 1. Even more remarkable are the disproportionately long pereopods 3 and 4 of the present material in comparison to those of Schellenberg, but this phenomenon is characteristic in allopatric populations of numerous species of Amphipoda.

The differences between the specimens at hand and the specimen of Schellenberg are presumably not attributable to differences in sex or size, for the largest specimen at hand is 28 mm long and thus approximates that of Schellenberg; even though it is a male, and Schellenberg's a female, the family Stegocephalidae is not known to have such extreme sexually dimorphic conditions.

FIGURE 69.—*Parandaniexis mirabilis* Schellenberg, male, 28.0 mm, Baja Slope Expedition Sta. P 285–61, lateral view of animal. Parts surrounding body are setae and hooks of sabellid and polynoid polychaetes found in alimentary tract of amphipod.

The prehensile character of pereopod 2 is unusual for Stegocephalidae but is reminiscent of similar conditions in various pelagic Lysianassidae suspected of being commensals with salps and tunicates. The benthic and not pelagic character of *Parandaniexis mirabilis* is, how-

FIGURE 70.—*Paramaeroides nitrophilus* S. Holmesblake, male, 28.0 mm. Base of pleopod 1 vouchered Sta. P 285–c 1; *a,b*, coxae 1,2; *c*, medial view of antenna 1, most aesthetasc removed; *d*, left inner plate of maxilliped; *e,f*, ends of percopods 1,2, medial; *g*, medial base of antenna 2; *h*, telson; *i*, upper lip; *j,k*, mandibles; *l*, palp of maxilla 1; *m,n*, maxillae 1,2; *o*, lower lip, right side in flattened view, left in normal condition folded to form channel; *p*, maxilliped. Female, 21.0 mm: *q*, uropod 3; *r*, end of percopod 2, lateral.

ever, supported by the presence of the remains of sabellid and nonpelagic polynoid polychaetes in its alimentary tract (see examples of avicular hooks and setae illustrated in fig. 69); sabellids are confined to the benthos. The subchelate pereopod 2 may be utilized in the capture of prey. As far as I am able to ascertain this is the first record of a predaceous benthic gammaridean.

Material.—Baja Slope Expedition station P 285–61 (two specimens 28 mm and 21 mm long).

In figure 70*o* the left side of the drawing shows the lower lip unflattened, the right side flattened.

Phippsiella Schellenberg

Phippsiella pajarella, new species

Figure 71

Description.—Unique specimen very small and at time of death about to undergo ecdysis; rostrum obsolete, lateral cephalic margin nearly straight; eyes absent; mouthparts generally as in *Stegocephalus inflatus* Krøyer (see Sars, 1895, pl. 69) but palp of maxilla 1 biarticulate, outer plate of maxilla 2 not as strongly geniculate, setae not as strongly hooked, outer plate of maxilliped with more complex armament (see figure), outer plate of maxilliped extending to middle of palp article 3, article 4 of palp about 60 percent as long as article 3; coxa 4 of medium expansion between those coxae of *P. similis* (Sars, 1895) and *P. viscaina*, new species, coxa 5 subacute posteroventrally; gnathopods reconstructed in figures from badly shriveled condition, slender; all pereopods with one margin of article 6 bearing notch and two spines, otherwise margins of sixth articles smooth except for minute distal coupling spine; posterior lobe of article 2 of pereopod 5 very broad and deeply rounded ventrally, more so than in other species of genus; pleonal epimera in poor condition, believed to be similar to those of *P. minima* Stephensen (1925) but epimeron 3 with small posteroventral tooth; outer rami of uropods 1 and 2 with one marginal spine each, outer ramus of uropod 3 uniarticulate; telson presumably cleft halfway, tissue occurring only in distal half and basal margins perhaps extended because of ecdysial conditions.

Holotype.—AHF No. 6035, juvenile, 2.1 mm. Unique.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720 m, Dec. 31, 1960.

Relationship.—This species has closest affinities with *Phippsiella minima* Stephensen (1925) because of the deeply rounded posteroventral lobe of article 2 on pereopod 5 but the specimen at hand has a much broader and longer lobe than does *P. minima*. The gnathopods

of *P. pajarella* may be like those of *P. minima* but they are in poor condition and are illustrated as reconstructions.

Phippsiella similis (Sars) (1895, pl. 70, fig. 1) has a stout gnathopod 1 and rounded but short posterior lobe of article 2 on pereopod 5.

Apparently *P. kergueleni* Schellenberg (1926b) has a fifth pereopod similar to that of the specimen at hand but the gnathopods are like

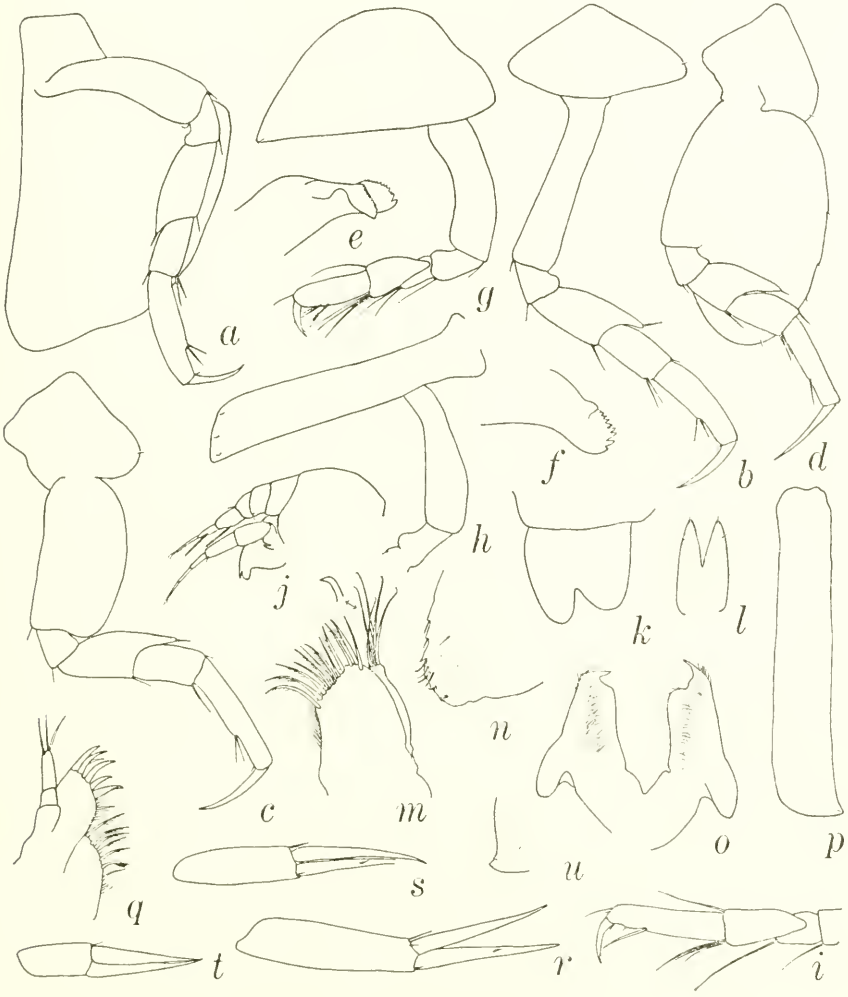


FIGURE 71.—*Phippsiella pajarella*, new species, holotype, juvenile, 2.1 mm, 7229: *a–d*, pereopods 2,3,4,5; *e,f*, mandibles; *g*, gnathopod 1, reconstructed; *h,i*, gnathopod 2 in two pieces, reconstructed; *j*, head, anteroventral portions and base of antenna 2 not clearly resolved; *k*, labrum; *l*, telson, stipples showing cellular content within chitinous skeleton; *m*, maxilla 2; *n*, outer plate of maxilliped; *o*, lower lip; *p*, coxa 3; *q*, maxilla 1; *r–t*, uropods 1,2,3; *u*, posteroventral corner of right pleonal epimeron 3.

those of *Stegocephaloides auratus* Sars (1895, pl. 70, fig. 3), unlike those of *P. pajarella*, and the third pleonal epimeron is prolonged posteriorly.

Phippsiella abyssicola Oldevig (1959), *P. longicornis* Gurjanova (1962), and *P. nipoma* J. L. Barnard (1961, 1962a) have fifth pereopods like those of *P. minima* and article 5 of gnathopod 1 on *P. longicornis* and *P. nipoma* is stout. *Phippsiella nipoma* has a shorter article 6 of gnathopod 2 than that reconstructed for *P. pajarella*.

Phippsiella rostrata K. H. Barnard (1932) has a large rostrum.

Phippsiella viscaina, new species

FIGURE 72

DIAGNOSIS.—Rostrum obsolete ventrally but front of head bearing a keel (see fig. 72 *j*); eyes absent; accessory flagellum uniarticulate; upper lip, mandibles, lower lip, and maxilla 2 like those of *Stegocephalus inflatus* Krøyer as figured by Sars (1895, pl. 69); maxilliped and maxilla 1 figured herein; coxa 4 narrow in comparison to that of *P. similis* (Sars, 1895), coxa 5 with posterior lobe subacute ventrally; gnathopods similar to *P. similis* but fifth articles more slender; article 2 of pereopod 4 tapering posterodistally, corner rounded, article 2 of pereopod 5 rather slender for genus, tapering distally, lobe subacute, extending beyond end of article 3, posterior margin with large serrations; pleonal epimera with minute points at posteroventral corners, epimeron 3 smooth posteriorly, with strong point marked below with notch and secondary point; uropods 1 and 2 with multispinose rami, outer ramus of uropod 3 uniarticulate; telsonic cleft slightly exceeding half.

HOLOTYPE.—AHF No. 6135, male, 3.3 mm.

TYPE-LOCALITY.—Station 7324, 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

MATERIAL.—Five specimens from the type-locality.

RELATIONSHIP.—The species of this genus differ among themselves by rather weakly developed characteristics. These are the shapes of the third pleonal epimera and the posterior lobes of article 2 on pereopod 5. The combination of a slightly pointed posterodistal lobe on article 2 of pereopod 5 plus a notch at the posteroventral corner of pleonal epimeron 3 are unique for *Phippsiella* and characterize *P. viscaina*. Pereopod 5 of *P. viscaina* is similar to that of *P. nipoma* J. L. Barnard (1961) and pleonal epimeron 3 is similar to that of *P. kergueleni* Schellenberg (1926b) but otherwise no judgment as to affinities of the new species can be made.

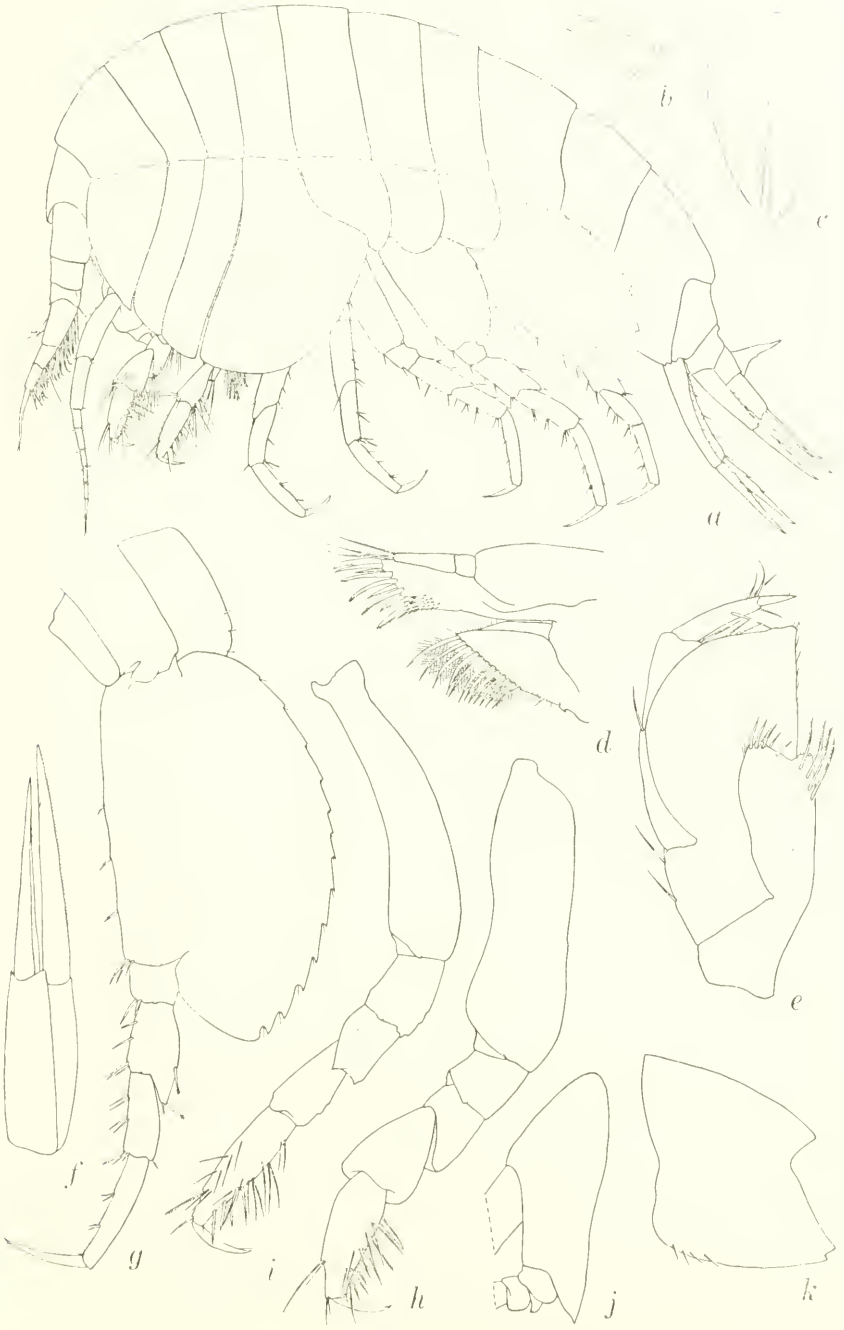


FIGURE 72.—*Phippsiella viscaina*, new species, holotype, male, 3.3 mm, 7234: *a*, lateral aspect; *b*, spine of maxilla 2; *c*, telson; *d*, maxilla 1; *e*, maxilliped; *f*, uropod 3; *g*, pereopod 5, medial; *h,i*, gnathopods 1 (lateral) and 2 (medial); *j*, head; *k*, pleonal epimeron 3, left.

Stegocephaloides Sars

Stegocephaloides camoti, new species

FIGURE 73

DIAGNOSIS.—Lateral cephalic lobes slightly produced, mammilliform, obtuse; eyes absent; first flagellar article of antenna 1 flattened and inflated (from lateral view); apices of lower lip with raggedly digitate processes; palp of maxilla 1 not reaching base of lateral spines on outer plate; inner plate of maxilliped short, broad, distally concave, just reaching basal joint of palp article 2; article 2 of pereopod 4 unexpanded, very slender; anterior margin of article 2 on pereopod 5 short for genus, remaining articles together longer than that margin, posterior lobe of article 2 reaching proximal joint of article 5, broad, distally rounded, posterior edge with 4 quadrate serrations; pleonal epimeron 1 with rounded posteroventral corner, epimeron 2 with quadrate corner, 3 with projecting, slightly retrorse tooth; outer ramus of uropod 1 shorter than inner, curved, unarmed; rami of uropod 2 equal to each other, outer with one small spine; peduncle of uropod 3 slightly expanded, poorly lamelliform, rami trihedral, outer biarticulate, inner slightly shorter than outer, both rami relatively short and broad for stegocephalids; telson cleft little more than one third of its length.

HOLOTYPE.—AHF No. 6136, ?male, 1.8 mm. Unique.

TYPE-LOCALITY.—Station 7234, 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

RELATIONSHIP.—This species has its closest affinities with the Antarctic *Stegocephaloides vanhoffeni* Schellenberg (1926a). Perhaps both species should be removed to a new genus. The mouthparts of the north Atlantic *Stegocephaloides christianiensis* (Boeck), the type-species, have never been figured but are said to resemble those of *Stegocephalus* Krøyer. If so, the new species and *S. vanhoffeni* differ from the type by the (?very short) distally excavate inner plate of the maxilliped (a character used to distinguish *Andaniopsis* Sars and *Andaniella* Sars); *Stegocephaloides camoti* also is distinguished by the complex digitation of the lower lip but this character is unknown for *S. vanhoffeni*. *Stegocephaloides camoti* and *S. vanhoffeni* differ from each other by the shape and ornamentation of pleonal epimeron 3, that of *S. vanhoffeni* having a blunt posteroventral projection, the posterior edge of which is armed with four strong teeth.

Stegocephaloides katalia J. L. Barnard (1962a) differs from *S. camoti* by the absence of a distinct tooth on the third pleonal epimeron and the broader second article of pereopod 4, the shorter posteroventral

lobe of article 2 on pereopod 5 and the longer anterior margin of that article. The expanded peduncle and shortened inner ramus of uropod 3 of *S. camoti* are also distinctive. No second article on the outer

FIGURE 73.—*Stegocephaloides camoti*, new species, holotype, ?male, 1.8 mm, 7234: *a*, lateral aspect; *b*, digitate processes of lower lip; *c*, gnathopod 1; *d*, head; *e,f*, mandibles; *g*, uropod 3; *h*, telson; *i*, maxilliped; *j*, lower lip; *k,l*, maxillae 1,2; *m–o*, pereopods 3,4,5; *p*, uropod 2.

ramus of uropod 3 has been detected in *S. katalia*. Indeed, that species may require the erection of a new genus. It stands between *Stegocephalina* Stephensen (1925) and *Stegocephaloides* Sars. It has the bidigitate processes of the lower lip, the partially expanded article 2 of pereopod 4 (that in *Stegocephalina* is even broader), the simple setae on the outer plate of maxilla 2, and the uniarticulate rami of uropod 3 characteristic of *Stegocephalina*; but *Stegocephaloides katalia* differs from *Stegocephalina* by the short, broad upper lip. *Stegocephaloides katalia* presumably differs from the type-species of *Stegocephaloides* (mouthparts never figured) in the slightly expanded article 2 of pereopod 4, the absence of hooks on the setae of the outer plate of maxilla 2, their greater length, and the complex digitation of the lower lip.

The outer species of *Stegocephaloides* differ from *S. camoti* in the strongly tapering, pointed, or nearly pointed posteroventral lobe of article 2 on pereopod 5.

Unknown Genus and Species

FIGURE 74

DESCRIPTION.—Body, antennae, and pleonal epimera with the aspect of *Andaniopsis nordlandica* (Boeck) (see Sars, 1895, pl. 72, fig. 2); accessory flagellum with small but not vestigial article 2; head with lateral aspect of *Andaniella pectinata* Sars (1895, pl. 72, fig. 3); mandibles poorly dentate and resembling those of *Andaniopsis;* maxilla 1 with the aspect of *Andaniella*, palp uniarticulate, much shorter than that shown by Sars for *Andaniella*; maxilla 2 resembling that of *Andaniella*, outer lobe, when completely flattened, probably as broad as that shown by Sars but attached obliquely and appearing to be slender on specimen at hand; inner and outer plates of maxillipeds of the same relative sizes as in *Andaniopsis* but inner plates not exceeding proximal end of palp article 1 in resemblance of *Andaniella*, outer plates much smaller than those of *Andaniella*, reaching only middle of palp article 2; maxillipedal palp resembling that of *Andaniopsis* more than that of *Andaniella*, having article 2 slightly longer than 1; gnathopod 1 resembling that of *Andaniopsis* but shorter and having article 5 very short; gnathopod 2 differing from that of either genus, with hand relatively stout and short, having a false palm bearing two stout spines; gnathopodal dactyls simple, like those of *Andaniopsis* but distinct from spinose dactyls of *Andaniella*; coxa 4 with symmetrical shape of *Andaniella*, not *Andaniopsis*; pereopods 1–4 differing from those of both genera by their youthful turgidity; article 2 of pereopod 5 resembling that of *Andaniopsis* with posterior lobe subacute but remain-

FIGURE 74.—Stegocephalidae, unknown genus and species. Juvenile, 1.7 mm, 7229: *a,b*, mandibles; *c*, head; *d,e*, gnathopod 1, medial; *f,g*, gnathopod 2, lateral; *h–l*, pereopods 1,2,3,4,5; *m,n*, maxillae 1,2; *o*, lower lip, broken at left; *p*, inner plate of maxilliped; *q*, maxilliped.

ing articles distinct from either genus, all short, stubby, poorly produced, subequal in length, except for dactyl; uropods 1 and 2 with rami equaling peduncles in length, uropod 3 with aspect of *Andaniopsis*, rami equal to peduncle, outer with faint articulation between articles 1 and 2 but without circumferential difference as in *Andaniopsis*.

Material.—Station 7229, juvenile, 1.7 mm.

Remarks.—This stegocephalid is presumably a juvenile; its poorly setose and poorly differentiated pereopodal articles are indicative of its youth. It has generic characters of both *Andaniella* (maxillipedal inner plates, maxilla 1) and *Andaniopsis* (maxilliped except inner plates, gnathopods, uropod 3, mandibles) and its coxa 4 resembles that of *Andaniella*. Both genera are monotypic and may have to be united through the species at hand but a redefinition of the two genera, based on spinose gnathopodal dactyls of *Andaniella*, would permit their retention. The specimen at hand then would be assignable to *Andaniopsis*.

The upper lip and epistome of the specimen at hand were irreparably damaged during dissection and the possible generic importance of these characters prevents me from naming the specimen.

Stenothoidae

Metopa Boeck

Metopa ?samsiluna J. L. Barnard

Figures 75, 76

?Mcopa (*Prometopa*) *samsiluna* J. L. Barnard, 1966a, pp. 91–92, fig. 42.

This large *Metopa* may be the male of *M. samsiluna*, of which only the female has been described. Apart from its masculine characters, however, it differs from the female in the nontapering second articles of pereopods 4 and 5 and has faint, bleached eyes composed of scattered biblastomeric ommatidia. It resembles the female in antennae, telson, accessory flagellum, coxae, gnathopod 1, and uropods.

This male differs from the males of the several species discussed as possible close relatives of the female by J. L. Barnard (1966a). It is very close to *M. boecki* Sars (1895, pl. 88) but the outer ramus of uropod 2 is shorter than the inner, the palm of gnathopod 2 lacks the deep excavation and gnathopod 1 is stouter and more strongly subchelate than in *M. boecki*. Antennae and uropods show affinities with

M. spectabilis Sars (1895, pl. 87) and *M. alderi* (Bate) (see Sars, 1895, pl. 86) but the palm of gnathopod 2 is not excavate and the dactyls of pereopods 4 and 5 are very elongated.

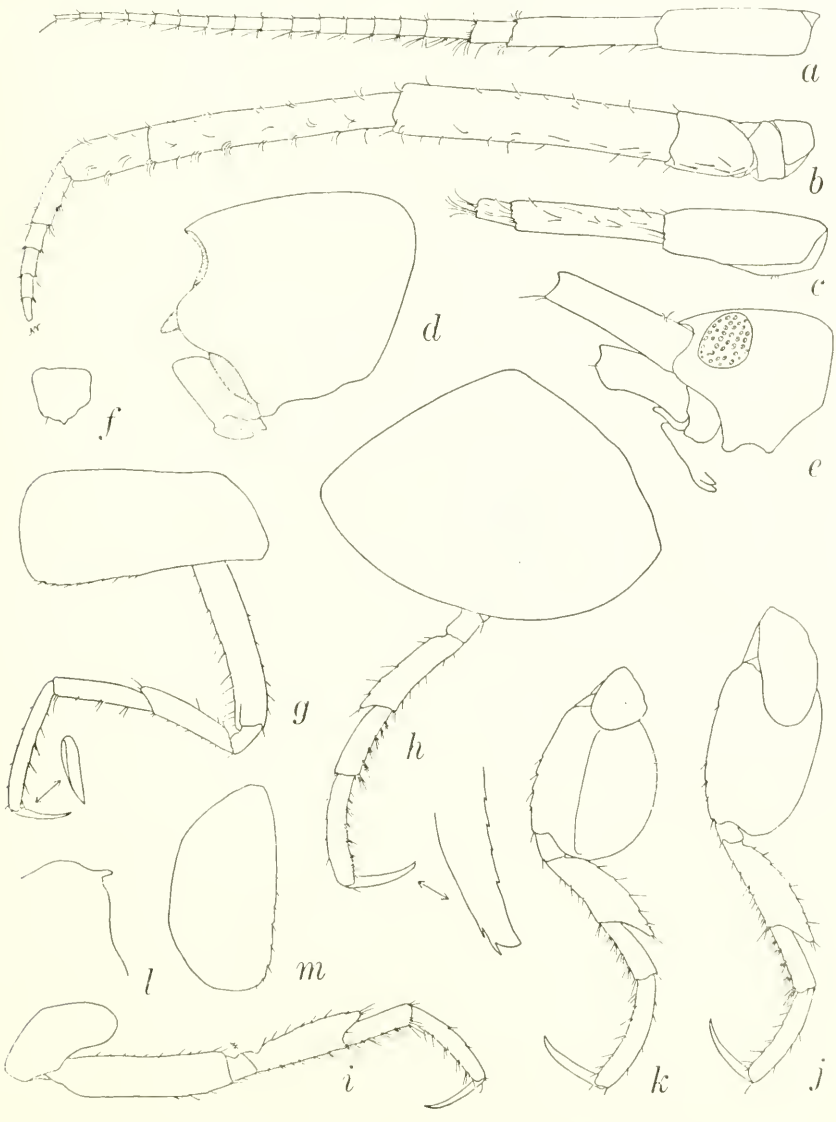


FIGURE 75.—*Metopa ?samsiluna* J. L. Barnard, male, 5.4 mm, 7359: *a*, dorsal view of antenna 1 (same magnification as fig. *d*); *b*, medial view of antenna 2 (same magnification as fig. *d*); *c*, medial view of antenna 1; *d*, head, stippled and hatched portions showing midsagittal keel and epistome-labrum complex; *e*, head, eye and bases of antennae; *f*, coxa 1; *g–k*, percopods 1,2,3,4,5; *l*, apex of one lobe of lower lip; *m*, coxa 2.

FIGURE 76.—*Metopa ?samsiluna* J. L. Barnard, male, 5.4 mm, 7359: *a,b*, maxillae 1,2; *c*, accessory flagellum and distal end of article 3 of antenna 1; *d,e*, gnathopods 1,2; *f*, mandible; *g–i*, uropods 1,2,3; *j*, telson; *k*, ventral outline of pleonal epimera 1–3, left to right; *l*, maxilliped.

Perhaps the closest affinity of this species is with *M. abyssalis* Stephensen (1931) but the second gnathopodal palms of that species are shorter and more transverse and the proportions of the three articles of uropod 3 are different.

Metopa abyssi Pirlot (1936) has short dactyls on pereopods 3 and 5 and equal rami of uropod 2.

The assumed male of *M. samsiluna* has characteristic minute ornamentation on the pereopodal dactyls. The figured dactyl of pereopod 2 has broadly spread posterior notches and two anterodistal accessory cusps. Cusps but not serrations are absent on the dactyl of pereopod 1, pereopods 3 and 4 have one cusp each and pereopod 5 has two cusps.

Midlateral sutures occur on article 5 of antenna 2; they are faint and may be artifacts although they occur on both sides of the animal and give the appearance of primordial segmentation often seen on antennal flagella.

Material.—Station 7359, male, 5.4 mm.

Distribution.—Southern California, 1620 m; ?middle Baja California, 1096 m.

Synopiidae

Austrosyrrhoe K. H. Barnard

Austrosyrrhoe ilergetes inconstans, new subspecies

Figure 77

Diagnosis.—Differing from the typical subspecies described by J. L. Barnard (1964b, Mediterranean bathyal) by the unexpanded sixth articles of pereopods 1 and 2, the slightly shorter article 5 of gnathopod 2, the slightly more slender article 2 of pereopods 3 and 4 and the subquadrate, not rounded, sinus of pleonal epimeron 3.

Holotype.—AHF No. 6036, female, 2.6 mm.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Material.—Three typical and one dubious specimens from the type-locality.

Remarks.—In addition to the above character differences, the third uropods of the specimens at hand have longer peduncles and relatively shorter rami than the typical subspecies. Because deep-sea specimens are often poorly preserved and damaged, one must question the representation of uropod 3 by Barnard (1964b).

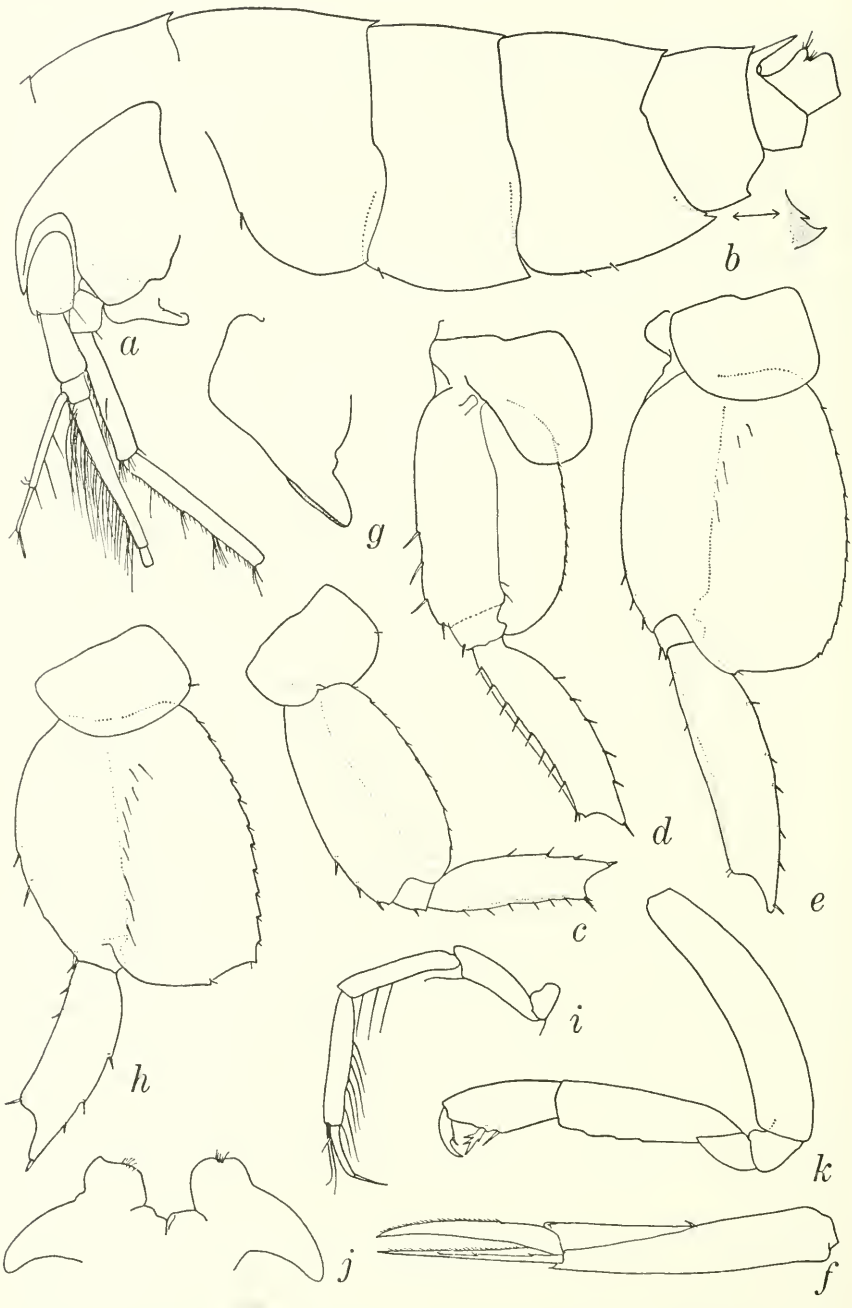


FIGURE 77.—*Austrosyrrhoe ilergetes inconstans*, new subspecies, male, 4.4 mm, 7229: *a*, head; *b*, pleon; *c–e*, pereopods 3,4,5, broken; *f*, uropod 3. Female, holotype, 2.6 mm, 7229: *g*, labrum, left lateral; *h*, pereopod 5; *i*, pereopod 2; *j*, lower lip, damaged; *k*, gnathopod 2, minus setae.

The illustrated male of this subspecies (male undescribed for typical subspecies) differs from the female by the slightly shorter and stouter peduncular articles of antenna 1, the elongated article 2 of the accessory flagellum, and the basally coalesced articles of the primary flagellum armed with sensory setae. Configurations of the expanded lobe of article 2 on pereopod 5 differ among male and female of the subspecies at hand and the female of the typical subspecies as shown in the various figures.

The outer rami of uropod 3 of *A. i. inconstans* have distinctly articulated terminal portions, a condition suggested for the typical subspecies by the spined distal notches.

A second, unfigured male from 7229 is dubiously assigned to this subspecies; its pleonal epimeron 3 lacks any posteroventral sinus and accessory tooth.

Austrosyrrhoe priscis, new species

FIGURES 52 *i–k*, 78

DIAGNOSIS OF FEMALE.—Rostrum thick, deflexed; lateral cephalic lobes anteriorly truncate and not delineated from remainder of head; antennae of medium length, article 2 longer than article 1 and produced anterodistally into a long cusp guarding article 3, article 3 shorter than article 1, article 1 with dorso- and ventrodistal processes, accessory flagellum biarticulate, article 2 minute; coxa 3 with pointed and produced anteroventral corner, posterior edge broadly excavate, slightly lobate at posteroventral corner, coxa 4 of medium size for genus, slightly expanded distally, poorly excavate posteriorly; gnathopod 1 stout, article 5 of gnathopod 2 not strongly elongated, palms of gnathopods 1 and 2 defined by one stout, serrate spine, article 6 of gnathopod 1 relatively slender (in comparison to *A. septentrionalis* Stephensen, 1931); article 6 of pereopods 1 and 2 slightly inflated, strongly setose posteriorly; article 2 of pereopod 5 relatively slender in comparison to other species of genus; pleonites 1–4 each with small dorsoposterior tooth, segment 5 with long, slender tooth; pleonal epimeron 1 with slightly produced posteroventral corner, epimeron 2 with distinct, blunt posteroventral tooth, 3 with small posteroventral hook; rami of uropods 1 and 2 simple apically, rami of uropod 3 interequal in length, outer ramus uniarticulate; uropodal peduncular processes when present small; telson elongate, badly damaged, with evidence of minute cleft.

REMARKS.—Mouthparts agreeing generally with those of *Austrosyrrhoe ilergetes* J. L. Barnard (1964b) but mandible illustrated to

FIGURE 78.—*Austrosyrrhoe priscis*, new species, holotype, female, 3.5 mm, 7234: *a*, lateral aspect; *b*, head, antenna 2 and epistome-labrum complex; *c–e*, uropods 1,2,3; *f*, telson; *g,h*, gnathopods 1,2; *i*, antenna 1; *j*, mandible; *k*, percopod 1; *l*, apex of telson, damaged.

show its flattened molar with one spine and remnants of triturating cylinder; lower lip, although damaged, bearing inner lobes.

MALE.—Station 7229, 3.4 mm long; differing from female by shorter article 2 of first antennal peduncle but article 2 bearing similar dorsodistal process; flagellar base formed of coalesced articles bearing sensory setae; accessory flagellum 3-articulate; dorsomedial teeth of pleonites 1–3 much smaller than in female and nearly obsolete; pleonites 4 and 5 dorsally elevated, tooth of pleonite 4 obsolete, tooth of pleonite 5 elongate, acute, pleonite 6 with erect, spinose process; telson in good condition, with deeper cleft than observed on damaged female. Pereopod 5 missing.

HOLOTYPE.—AHF No. 6117, female, 3.5 mm.

TYPE-LOCALITY.—Station 7234, 27°38′00″ N, 115°16′16″ W, 791–842 m, Jan. 2, 1961.

MATERIAL.—The holotype and the male from station 7229.

RELATIONSHIP.—This species closely resembles *Austrosyrrhoe ilergetes* J. L. Barnard (1964b) but differs, as it does from all other austrosyrrhoes, by the occurrence of a large process on article 2 of antenna 1. It shares with *A. ilergetes* the slightly inflated sixth articles of pereopods 1 and 2 but its pleonal epimeron 3 is not bidentate at the posteroventral corner, its coxa 3 has a narrower posterior lobe, the uropods are very different and gnathopod 1 is much stouter. The first gnathopod is similar to that of *A. septentrionalis* Stephensen (1931) but the telson of the latter is broad and deeply cleft, article 6 of gnathopod 1 is much stouter, has a distinctly transverse palm, and uropods 1 and 2 have long apical spines on the rami. Coxa 3 of *A. septentrionalis* is narrower than that of *A. priscis*. The mouthparts of *A. septentrionalis* have not definitely been shown to be those of an *Austrosyrrhoe*.

Austrosyrrhoe priscis differs from *A. fimbriatus* (Stebbing and Robertson, 1891) in the poorly cleft telson, the simple rami of uropods 1 and 2, the stouter gnathopods, the first antennal process and the condition of pereopods 1 and 2.

The outer rami of uropod 3 of all species of *Austrosyrrhoe* (except that to follow) are biarticulate; the joint of the second article in *A. priscis* is very difficult to detect because it has no defining spines. *Austrosyrrhoe ilergetes* is remarkable in that it appears to have second articles on the inner rami of uropods 1 and 2.

The obsolescence of dorsal teeth on male pleonites 1–3 is reminiscent of the condition in *A. torpens* J. L. Barnard (see 1962a, 1964b) and suggests the possibility that *A. ilergetes* J. L. Barnard (1946b) is the

female of *A. torpens*. J. L. Barnard has already made the point that his *A. torpens* may be identical with *A. crassipes* K. H. Barnard.

Distribution.—Middle Baja California, 842–1720 m.

Austrosyrrhoe rinconis, new species

Figure 79

Diagnosis.—Rostrum moderately short, very stout, not downturned, slightly curved; lateral cephalic lobes not as strongly flattened as in other known species of the genus; antennae short, equal in length, article 2 of antenna 1 simple, equal to article 1 in length, article 1 with recurved distal tooth, article 3 shorter than 2, accessory flagellum biarticulate, article 2 minute; coxa 3 with strongly pointed and produced anteroventral corner, posterior edge poorly excavate, lacking distinct posteroventral lobe, coxa 4 large for genus, slightly expanded distally, posterior margin sharply excavate; gnathopod 1 of medium thickness, article 6 relatively slender, article 5 of gnathopod 2 not strongly elongated; palms of gnathopods 1 and 2 defined by two stout, serrate spines; article 6 of pereopods 1 and 2 slender, linear, sparsely setose; article 2 of pereopod 5 relatively slender in comparison to other species of genus; pleonites 1, 2, 3, and 5 each with small, sharp, straight dorsal tooth; pleonal epimera 2 and 3 each with posteroventral tooth of medium size, that of 2 sharper, epimeron 1 large, extending ventrally as subtriangular, distally subacute process lacking small tooth; rami of uropod 3 interequal in length, outer ramus probably biarticulate; uropodal peduncular processes when present, small; telson short, not reaching halfway along rami of uropod 3, cleft 40 percent of its length.

Remarks.—Mouthparts agreeing generally with those of *Austrosyrrhoe ilergetes* J. L. Barnard (1964b) but mandibular palp very slightly longer, inner plate of maxilliped with more distinctly cuspidate mediodistal corner; left mandible lacking but right mandible bearing one small marginal spine on molar, both mandibles bearing lacinia mobilis, bifid on right mandible; outer plates of maxilla 1 with 9 and 10 spines respectively; lower lip broken during dissection and not analyzed.

Holotype.—AHF No. 6116, female, 3.0 mm. Unique.

Type-locality.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

Relationship.—By virtue of its pereopods 1 and 2, head, coxae, uropods, telsonic length, and pleonal epimera this species is most closely related to *A. septentrionalis* Stephensen (1931) and might be a subspecies or even a developmental stage of that species. Numerous

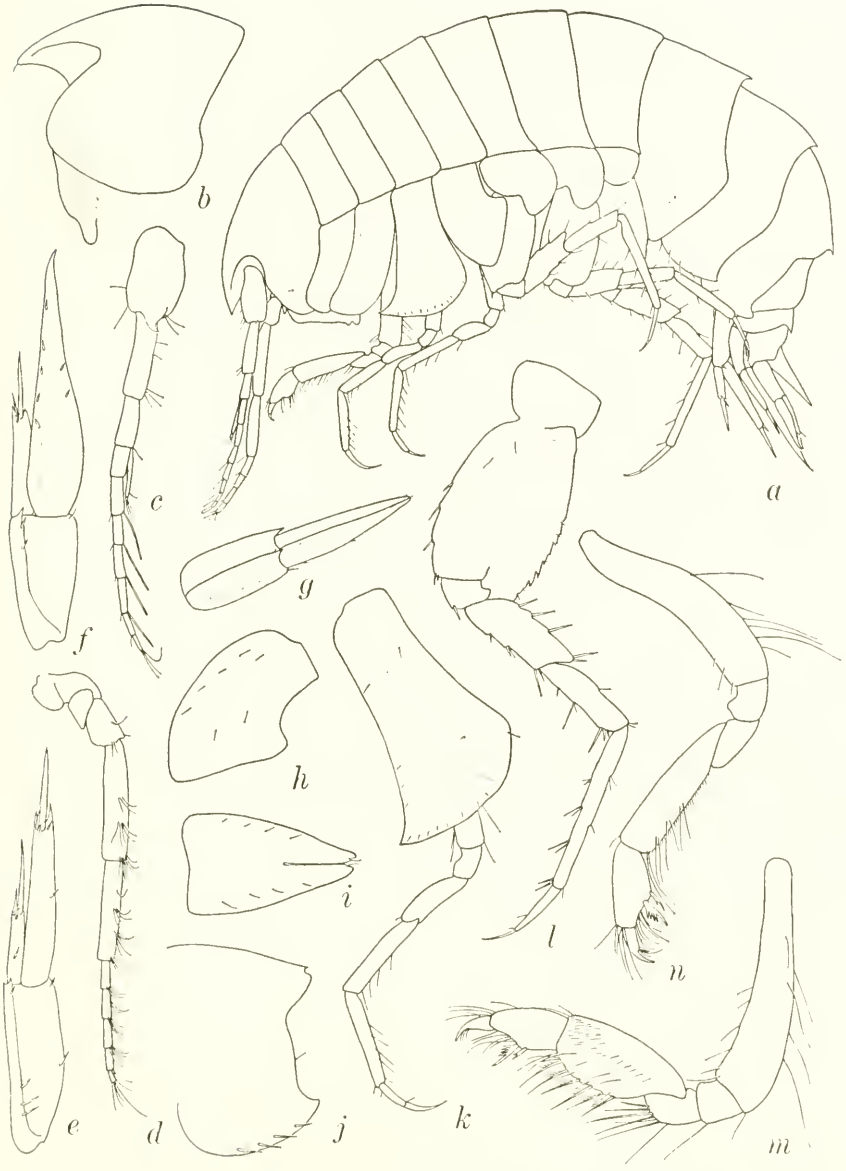


FIGURE 79.—*Austrosyrrhoe rinconis*, new species, holotype, female, 3.0 mm, 7358: *a*, lateral aspect; *b*, head and stippled labrum; *c*, antenna 1, medial; *d*, antenna 2, left side but medial view; *e–g*, uropods 1,2,3; *h*, coxa 4; *i*, telson; *j*, pleonal epimeron 3, left; *k,l*, pereopods 1,5; *m,n*, gnathopods 1,2.

small differences indicate, however, that the two forms are probably distinct. *Austrosyrrhoe rinconis* has a distinct dorsal tooth on pleonite 5, coxa 3 has a distinctly produced anterior corner, gnathopod 1 has a slender article 6, gnathopod 2 has a short article 5, the telsonic cleft is shorter, the second article of pereopod 5 is slightly narrower and rounded posteroventrally, the shape of pleonal epimeron 1 differs, article 2 of antenna 1 is shorter and article 3 shorter than in *A. septentrionalis*.

The new species differs from *A. ilergetes* J. L. Barnard (1964b) and *A. torpens* (J. L. Barnard, 1962a, 1964b) in the short and more deeply cleft telson, the shapes of the pleonal epimera, the uninflated sixth articles of pereopods 1 and 2 and the shapes of coxae 3 and 4. *Austrosyrrhoe priscis*, new species, is easily distinguished from *A. rinconis* by the large process on article 2 of antenna 1. *Austrosyrrhoe fimbriatus* (Stebbing and Robertson, 1891) has pleonal epimera, uropods, pereopods, and coxae resembling those of *A. rinconis* but apparently it has a more deeply cleft telson and a peculiar gnathopod 2 with very slender and nearly simple article 6.

Bruzelia Boeck

Bruzelia ascua J. L. Barnard

Bruzelia ascua J. L. Barnard, 1966a, p. 94, figs. 45, 46.

A male, 4.3 mm long has been dissected for confirmation of this identification. Pereonites 1 and 2 are immovably fused together along most of their dorsal juncture, although a chitinous fold marks their boundaries.

Material.—Station 7229 (8).

Distribution.—Southern California to middle Baja California, 1687–1720 m.

Bruzelia inlex, new species

Figure 80

Diagnosis.—Article 1 of antenna 1 lacking distal process; mouthparts like *B. typica* Boeck (see Sars, 1895, pl. 138); coxa 3 with anterodistal point, coxa 4 not shorter than coxa 3; ventrolateral margins of pereonites lacking teeth; only pereonite 7 and pleonites 1, 2, and 4 with distinct dorsal teeth, those of pleonites 1 and 2 short and posteriorly directed, tooth of pleonite 4 sharp and erect, although thin and small; pleonal epimeron 3 with large retrorse, posteroventral tooth, posterior margin not shortened; pleonal epimeron 2 with small retrorse posteroventral tooth.

Holotype.—AHF No. 6023, female, 5.0 mm.

Type-locality.—Station 7229, 27°54′25″ N., 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Material.—Stations 7229 (29), 7231 (3).

Figure 80.—*Bruzelia inlex*, new species, holotype, female, 5.0 mm, 7229: *a*, lateral aspect; *b*, mandible; *c,d*, gnathopod 1; *e,f*, gnathopod 2; *g*, pereopod 1, *h*, antenna 1, right medial; *i*, antenna 2, right lateral; *j,k*, telson; *l–n*, uropods 1,2,3. Juvenile, 2.3 mm, 7231; *o*, pereonite 7 and pleonites 1–3, dorsal.

Relationship.—This species resembles *B. diodon* K. H. Barnard (1916, and see J. L. Barnard, 1962a) but the dorsal teeth of *B. diodon* occur on pereonite 7 and pleonite 1 and no tooth occurs on pleonite 4.

Young individuals of this species, less than 2.0 mm long, lack the dorsal teeth of pereonite 7 and pleonites 1 and 2 but have the tooth of pleonite 4 fully developed. Most specimens 4.0 mm long or longer (to 5.5 mm) have all of the dorsal teeth fully developed but a few specimens exceeding 4.0 mm lack the tooth of pereonite 7. Fifteen of the 29 specimens from 7229 have all teeth fully developed and all are 4.0 mm or longer but 14 specimens, most of which are shorter than 4.0 mm, lack either the tooth of pereonite 7 or all of the teeth.

Distribution.—Middle Baja California, 1748–2398 m.

Pseudotiron Chevreux

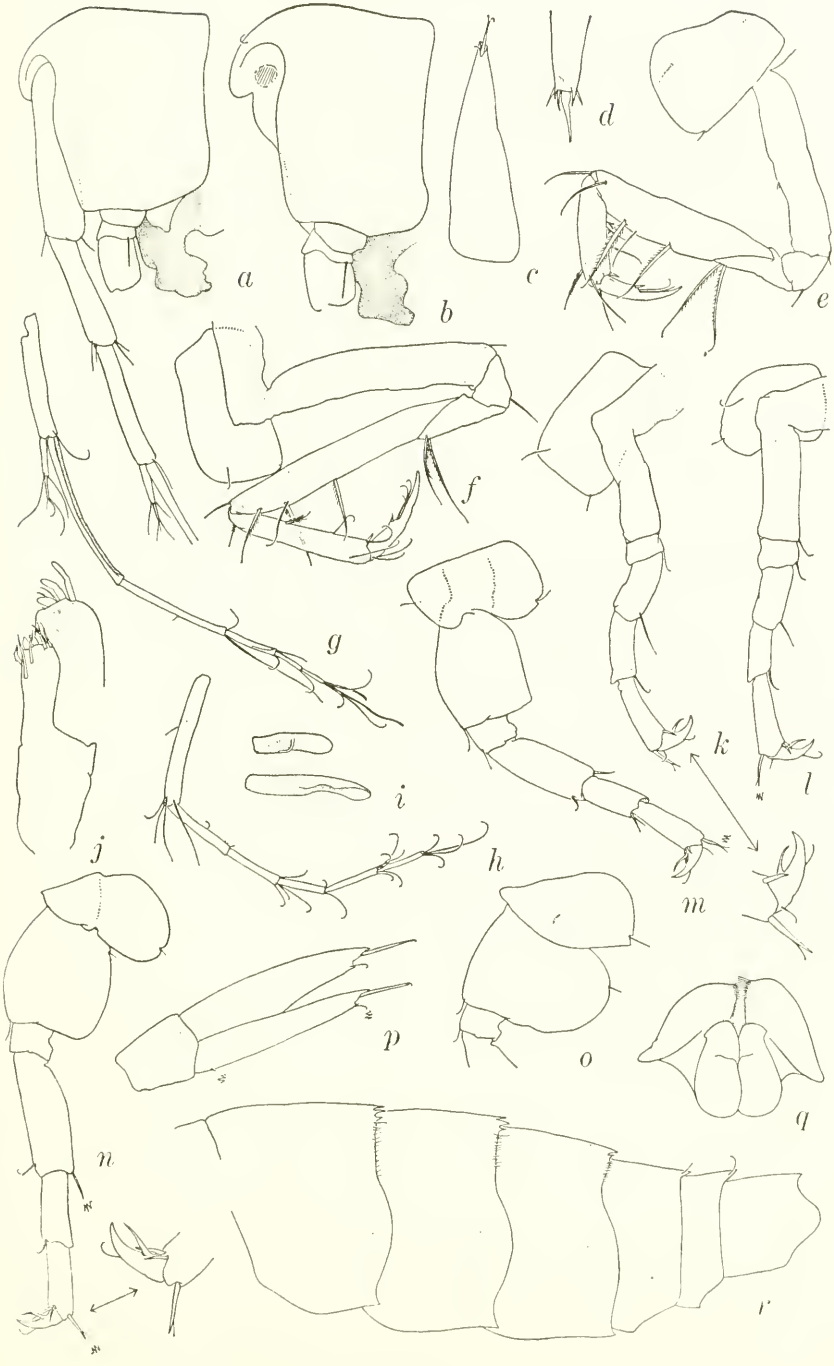
Pseudotiron (?) *coas*, new species

Figure 81

Description.—Head not strongly extended anterodorsally, rostrum terminating bluntly on anterior portion of head, separated from anterior cephalic keel by deep incision, anterolateral cephalic margin nearly vertical, straight, anteroventral corner rounded subquadrately; eyes absent; first antennal peduncle elongated, article 3 slightly longer than article 2, accessory flagellum 2-articulate; antennal flagella having elongated articles; basal article of first antennal flagellum not bearing typical sensory setae of male *Pseudotiron*; antenna 2 with elongated flagellar articles and a minute sixth; mouthparts similar to those of *P. longicaudatus* Pirlot (1934) but mandibular palp stouter, article 3 with two setae, article 2 lacking setae, mandibular body with only three or four setae in setal row; lower lip illustrated herein; maxilla 1 with four setae on medial lobe, seven spines on lateral lobe; medial lobe of maxilla 2 not as broad as in *P. longicaudatus*; outer maxilliped plate with only three large distal spines, none on medial margin, two of spines characteristically ridged (see figure); gnathopods of typical pseudotiron morphology but stouter than in type-species, *P. bouvieri* Chevreux, fifth articles not expanded proximally as in genus *Tiron* Liljeborg; coxa three nearly perfectly rectangular, not typically

→

Figure 81.—*Pseudotiron* (?) *coas*, new species, holotype, male, 3.0 mm, 7230: *a,b*, head, with and without antenna 1; *c*, half of telson; *d*, apex of inner ramus of uropod 2; *e,f*, gnathopods 1,2; *g*, peduncular article 3 and flagella of antenna 1; *h*, peduncular article 5 and flagellum of antenna 2; *i*, two apical spines of outer plate of maxilliped; *j*, maxillipedal inner and outer plates; *k–o*, pereopods 1,2,3,4,5; *p*, uropod 3, with spine missing on each ramus; *q*, lower lip; *r*, pleon.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L-shaped, scarcely convex posteriorly, coxa 4 smaller than coxa 3, obreniform; pereopods 1 and 2 with sixth articles equal to (pereopod 1) or longer than (pereopod 2) fifth articles, sixth articles distally expanded, anterodistal ends each having one large seta, posterodistal ends each bearing two conspicuous locking-spines, dactyls short and clawlike but not as modified as those of *P. bouvieri*, each dactyl (and those of pereopods 3–5) with large, partially fused inner seta and one minute lateral submarginal setule; pereopods 3 and 4 with sixth articles as long as or longer than fifth, expanded second articles with subquadrate posteroventral corners and nearly straight posterior margins; pereopod 5 longer than 4, with strongly expanded, dorsoventrally narrow but anteroposteriorly elongated and rounded lobe, articles 5 and 6 subequal to each other and scarcely shorter than article 4 (badly damaged and not illustrated); pleonites 1–3 posterodorsally serrate, consecutively with about 6, 5, and 3 serrations, pleonites 4 and 5 each with small posteromedial tooth; pleonal epimera all intersimilar, posterior margins convex, posteroventrally sinuous, each with small posteroventral tooth; uropods 1–3 in poor condition, similar to those of *P. bouvieri* as figured by J. L. Barnard (1964b) but each ramus with at least 1 long, distally articulated spine and apparently no marginal spines (unless broken off, sockets not apparent); uropod 3 with asymmetrically and bilaterally cuspidate ramal apices, each bearing one spine of medium length, one small seta and one very large socket of missing spine presumably much longer than remaining spine; telson typical, elongated, cleft to base, each lobular apex with one medium spine and one setule.

Holotype.—AHF No. 6038, male, 3.0 mm.

Type-locality.—Station 7230, 27°52′25″ N, 115°44′30″ W, 2667–2706 m, Dec. 31, 1960.

Material.—Two specimens from the type-locality.

Relationship.—This species bridges the distinctions between the genera *Tiron* Liljeborg and *Pseudotiron* Chevreux. It combines the gnathopods of *Pseudotiron* with coxa 3 of *Tiron;* however, the gnathopodal distinctions of the species at hand are only of quantitative degree in comparison with *Tiron.* They involve the elongated article 6 and the basally unexpanded article 5. The head of *P. coas* resembles that of various species of *Pseudotiron* more than that of various species of *Tiron.* This resemblance includes the extensive anterolateral cephalic excavation at the insertion point of antenna 1, resulting in a strangely dorsal position of the antennal base and a broad, flat anterocephalic margin, which projects and partially locks the first article of antenna 1 in the groove between the lateral margin and the weak anteromedial cephalic ridge. The elongation of the peduncular articles of antenna

1 also are characteristic of several species of *Pseudotiron* but never of *Tiron*.

Pseudotiron eous has its closest affinities with the type-species, *P. bouvieri* Chevreux, which has the characteristic t-shaped coxa 4; but, which unlike other members of *Pseudotiron*, has shortened first antennal peduncles. The resemblance between the two species occurs in the shape of the head and the short, complexly ornamented clawlike pereopodal dactyls. Other species of *Pseudotiron* have elongated, simple pereopodal dactyls, but various species of *Tiron*, such as the type-species, *T. spiniferum* (Stimpson) and *T. biocellatum* J. L. Barnard (1962b) have short, clawlike, partially ornamented dactyls, thus representing another case of character-mixing among species of the two genera.

Remarks.—A benthic feeding habit is indicated for the specimen at hand in view of the mineral particles occurring in the alimentary tract. The cephalic shapes of various members of *Pseudotiron* may be adaptations connected with rooting or ploughing in very fine sediments, the streamlined and elongated antennae being locked obliquely posteriorwards in the lateral cephalic channels during the process. Shallow-water synopiids with massive, unstreamlined heads may be adapted for rooting in coarse sediments.

***Pseudotiron longicaudatus greteus*, new subspecies**

Figures 82, 83

Diagnosis.—Head strongly arched forward, with antenna 1 attached very much posterior to frontal cephalic process, no distinct rostrum, with a notch on margin near insertion of antenna 1, small epistomal protrusion nearly hidden by lateral cephalic lobe occurring below notch; eyes absent; upper lip with small, blunt anterior process; coxa 1 small (relative to *P. golens* J. L. Barnard 1962a), coxa 3 short and truncate posteriorly (compared with *P. l. longicaudatus*), coxa 4 small (compared with *P. golens*); dactyls of gnathopods very long, lanceolate (compared with *P. bouvieri*); pleonal epimeron 1 with rounded posteroventral corner, epimera 2 and 3 slightly convex posteriorly, with poorly developed tooth at each posteroventral corner; dorsal margins of pleonites 1–3 sparsely serrate, two serrations on pereonite 7; pleonite 4 scarcely produced, 5 with long dorsal tooth; mouthparts like *P. l. longicaudatus* Pirlot (1934) but with slight variations in numbers of setae probably owing to age difference in specimens analyzed.

Holotype.—AHF No. 6024, male 7.0 mm.

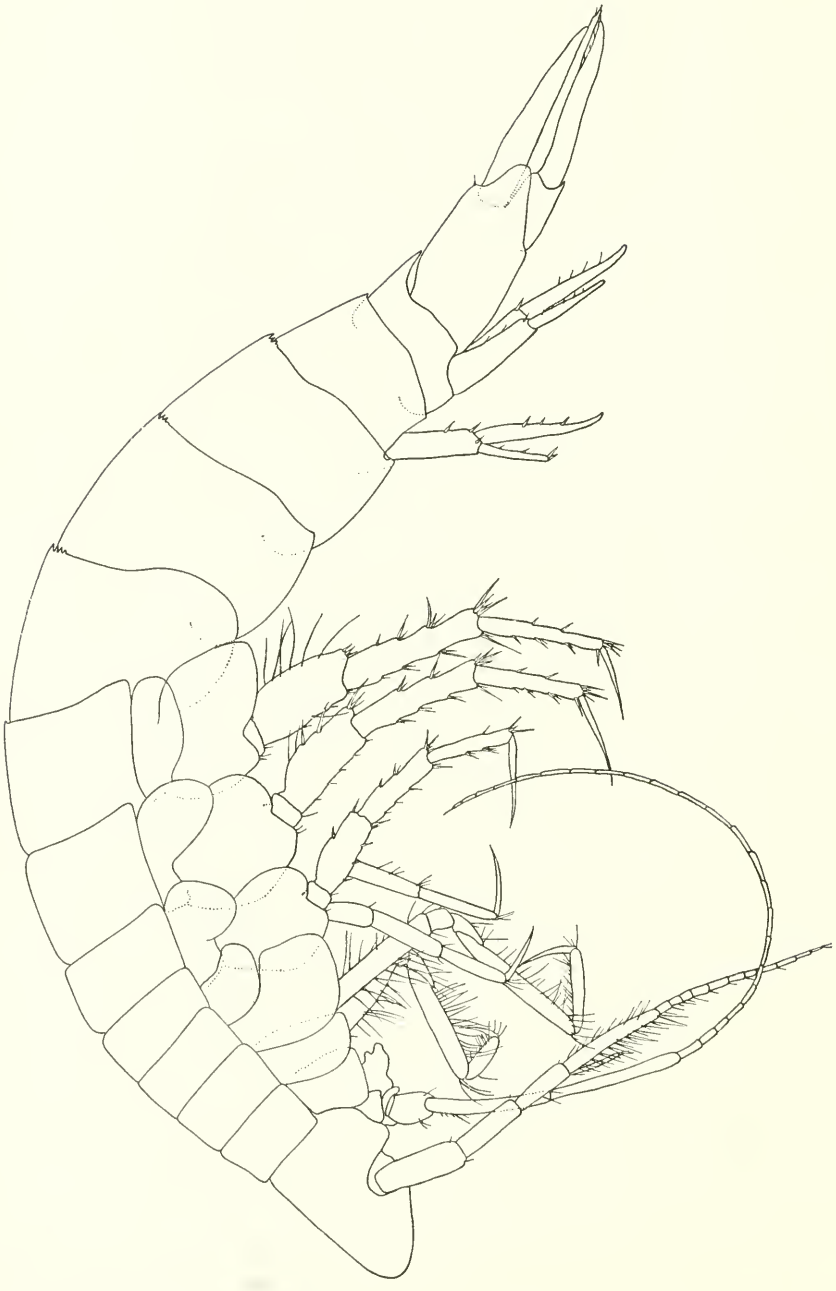

FIGURE 82.—*Pseudotiron longicaudatus greteus* new subspecies, holotype, male, 7.0 mm, 7229, lateral aspect.

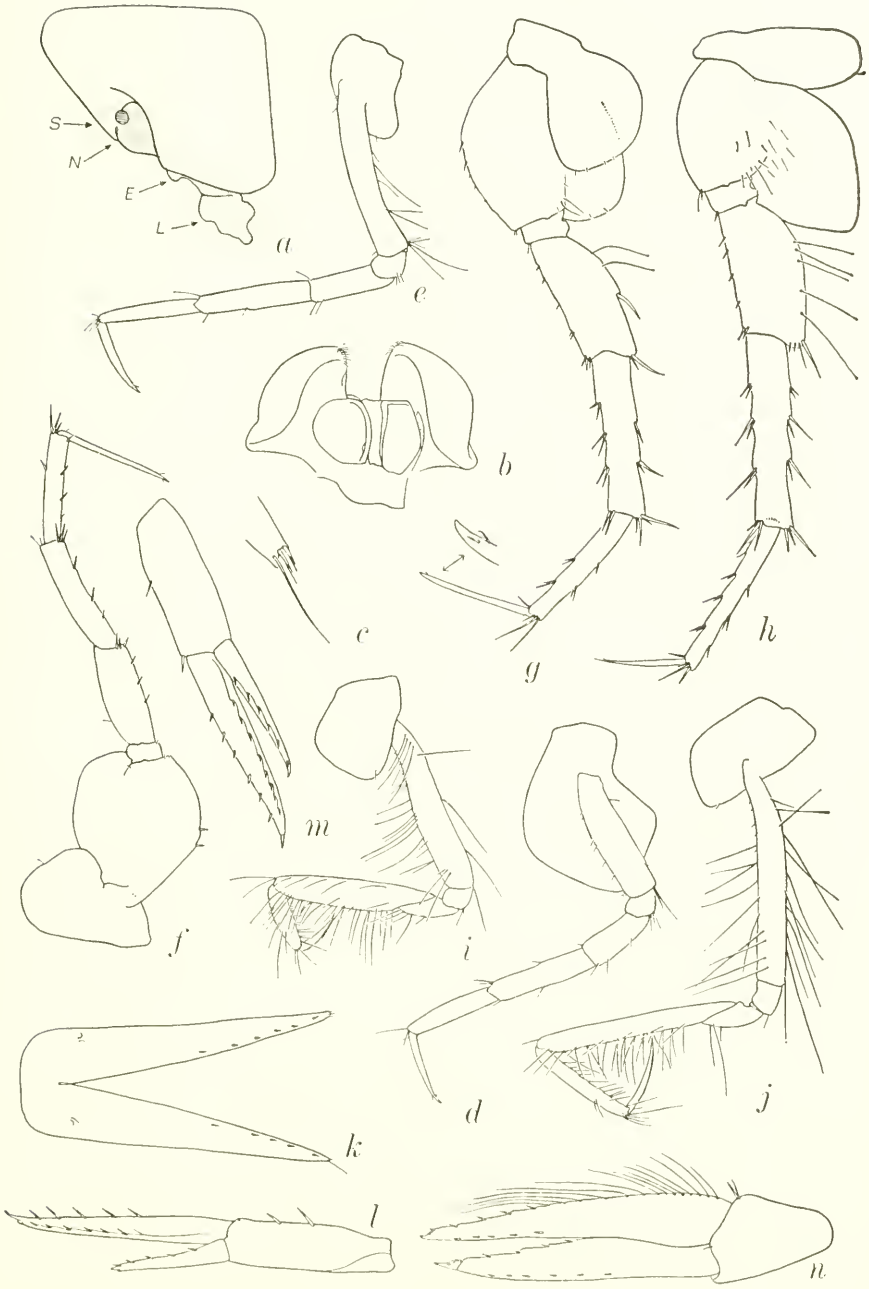

FIGURE 83.—*Pseudotiron longicaudatus greteus*, new subspecies, holotype, male, 7.0 mm, 7229: *a*, head (S=socket of antenna 1, N=rostroantennal notch, E=epistome, L=labrum); *b*, lower lip; *c*, apex of one lobe of telson; *d–h*, pereopods 1,2,3,4,5; *i,j*, gnathopods 1,2; *k*, telson; *l–n*, uropods 1,2,3.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Material.—Five specimens from the type-locality.

Remarks.—Only the truncate coxa 3, the apparently larger tooth of pleonite 5 and the slightly stouter fourth articles of pereopods 3–5 are of any quantitative value in erecting this subspecies. Coxa 6 has a longer posterior lobe than shown by Pirlot for *P. l. longicaudatus* in his view of the dissected appendage, but his whole-mount drawing shows the lobe to be present.

The head of *P. bouvieri* Chevreux (1895, and see J. L. Barnard, 1964b) is very different from that of the material at hand because it has a nasiform rostrum projecting apically and ventrally; and *P. bouvieri* has very short, ornamented pereopodal dactyls. *Pseudotiron golens* J. L. Barnard (1962a) has distinctive coxae, medium-sized pereopodal dactyls, rather quadrate pleonal epimera, almost no dorsal tooth on pleonite 4 and a short head.

The accessory flagellum of *P. l. greteus* is 3-articulate and males have the base of the flagellum of antenna 1 unsegmented. Two of the specimens are females and differ from the male only in the segmented flagellar base.

One of the females has a foregut entirely full of silt particles.

Pseudotiron pervicax, new species

Figure 84

Diagnosis.—Anterodorsal portion of head not strongly extended forward, intermediate between *P. longicaudatus* Pirlot (1934) and *P. bouvieri* Chevreux (1895, and see J. L. Barnard, 1964b), deflexed, rostrum acute but broad, essentially defined below by deep, rounded incision on anterior keel, latter projecting strongly in front of lateral cephalic lobes, latter quadrate; upper lip separated from anterior epistomal keel by strong notch; coxa 1 beveled anteroventrally, coxa 3 with posteroventral lobe poorly developed, subacute, coxa 4 not attenuated as in *P. longicaudatus;* dactyls of pereopods intermediate in size between those of *P. longicaudatus* and *P. bouvieri* but complexly armed as in *P. bouvieri;* pereopods 3–5 very short, fifth articles shorter than fourth, sixth even shorter than fifth; article 2 of pereopod 5 strongly expanded posteriorly, with posteroventral and posterodorsal margins symmetrically rounded (in contrast to *P. longicaudatus*); pleonites 1–3 each with small dorsal tooth, serrations on posterodorsal margins obsolete, pleonite 4 with large tooth masked by chitinous lamina, tooth of pleonite 5 very long, reaching to end of pleonite 6, latter short in comparison with *P. longicaudatus;* pleonal epimeron 1 rounded posteroventrally, 2 and 3 with slightly convex posterior margins and small

posteroventral tooth; outer rami of uropods 1 and 2 only half as long as inner, apices of rami spinose.

Holotype.—AHF No. 6115, male, 4.7 mm. Unique.

Type-locality.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

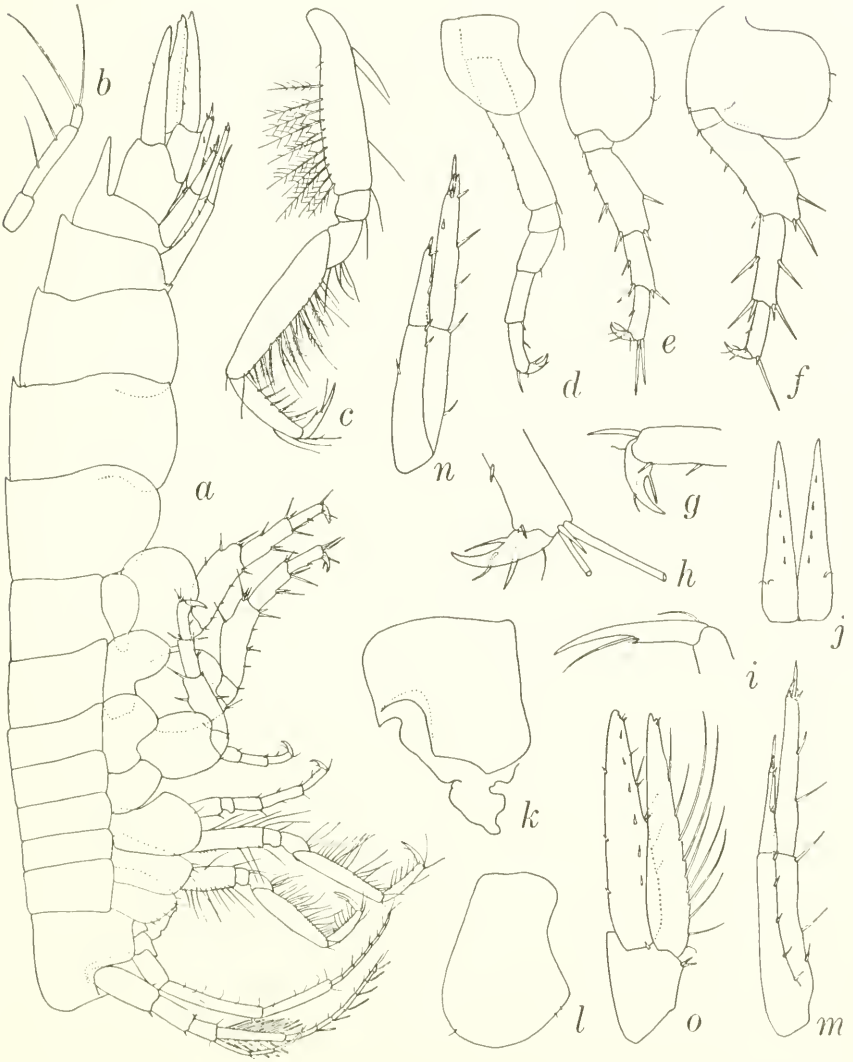

Figure 84.—*Pseudotiron pervicax*, new species, holotype, male, 4.7 mm, 7358: *a*, lateral aspect; *b*, mandibular palp; *c*, gnathopod 1; *d f*, pereopods 2,3,5, latter two appendages reduced in size from pereopod 1 and gnathopods; *g,h*, dactyls of pereopods 2,5; *i*, dactyl of gnathopod 2; *j*, telson, reduced in scale from uropods; *k*, head; *l*, coxa 3; *m–o*, uropods 1,2,3.

Relationship.—This species resembles *P. bouvieri* more than *P. longicaudatus* by virtue of the dactyls of its pereopods being complexly armed but it has many differences from *P. bouvieri*, as follows: the shape of the head, with its anterior keel extending ventrally from and defining the limits of the rostrum and projecting beyond the distinct, quadrate lateral cephalic lobes; the weakness of the pleonal serrations; the absence of a posteroventral tooth on pleonal epimeron 1; the poorly developed, nonquadrate posterior lobe of coxa 3; the short coxa 4; the longer tooth of pleonite 5; the shorter outer rami of uropods 1 and 2; the anteriorly beveled coxa 1; and the shortness of pereopods 3–5 with their short fifth articles.

Article 2 of gnathopod 2 of *P. pervicax* has only three anterior setae compared to the numerous setae of that article on gnathopod 1. The mouthparts are similar to those figured for *P. longicaudatus* by Pirlot (1934) but articles 1 and 3 of the mandibular palp are longer (see fig. 84) and the ratios of spines on maxilla 1 differ, the inner lobe having 12 setae, the outer 9 spines, and the apex of palp article 2 with only 6 stout spines (plus the usual subterminal thin spines shown by Pirlot). Pereopod 1 is longer and more strongly spinose than is pereopod 2. The apices of the rami of uropod 3 are damaged.

Syrrhoites Sars

Key to the Species of *Syrrhoites*

1. Pleonite 3 bidentate dorsally . . . . . **S. serrata** (Sars)
   Pleonite 3 unidentate or untoothed dorsally 2
2. Pleonite 5 untoothed 3
   Pleonite 5 with distinct tooth 4
3. Dorsal carina and teeth commencing strongly on pereonite 5, pleonal epimeron 3 with medium sized acute posteroventral tooth.
   S. sorpresa (J. L. Barnard)
   Dorsal carina and teeth commencing weakly on pereonite 6, pleonal epimeron 3 quadrate posteroventrally, with minute tooth . **S. tenella** K. H. Barnard
4. Pleonal epimeron 2 rounded posteroventrally 5
   Pleonal epimeron 2 quadrate posteroventrally or with minute tooth . . 7
5. Pleonal epimeron 3 prolonged posteroventrally but lacking distinct tooth.
   S. walkeri Bonnier
   Pleonal epimeron 3 with distinct, small posteroventral tooth 6
6. Dorsal carina and teeth commencing strongly on pereonite 2.
   S. lorida (J. L. Barnard)
   Dorsal carina and teeth commencing weakly on pereonite 6.
   S. cohasseta, new species
7. Peduncles of uropods 1 and 2 lacking distolateral processes 8
   Peduncles of uropods 1 and 2 bearing distolateral processes 9
8. Telson cleft less than halfway . . . . . **S. redox,** new species
   Telson cleft more than halfway . . . . . **S. terceris** J. L. Barnard

9. Pleonal epimeron 3 lacking distinct posteroventral tooth . **S. trux**, new species
   Pleonal epimeron 3 bearing distinct posteroventral tooth 10
10. Tooth of pleonal epimeron 3 long and serrate . **S. anaticauda** K. H. Barnard
    Tooth of pleonal epimeron 3 short and smooth 11
11. Rostrum very long and downturned . . . . . **S. pusilla** Enequist
    Rostrum medium in length and horizontal 12
12. Pleonal epimeron 3 with posteriorly beveled ventral margin and very short posterior margin, lacking serrations, article 5 of pereopods 1 and 2 with numerous posterior setae, article 5 of gnathopod 2 elongated, article 2 of pereopod 5 broadly expanded ventrally . . . . . **S. dulcis**, new species
    Plenal epimeron 3 with straight ventral margin and long posterior margin, with 2 serrations, article 5 of pereopods 1 and 2 with few posterior setae, article 5 of gnathopod 2 scarcely elongated, article 2 of pereopod 5 narrowly expanded ventrally . . . . . **S. silex**, new species

Syrrhoites cohasseta, new species

FIGURE 85

DIAGNOSIS OF FEMALE.—Rostrum very slender, long, turned downward strongly; lateral cephalic lobes scarcely projecting, truncate, anteroventral corners rounded; antennae very slender but antenna 2 not elongated, articles 2 and 3 of antenna 1 peduncle each longer than article 1, latter with small distomedial tooth, accessory flagellum biarticulate, article 2 very short; gnathopods slender, article 5 of gnathopod 2 unusually elongated; anteroventral corner of coxa 1 rounded-quadrate, anterior edge concave, posteroventral corner of coxa 3 rounded-quadrate, posterior margin scarcely excavate, coxa 4 with small blunt posterodistal protrusion, ventral margin not strongly oblique; pereopods 1 and 2 with long setae on article 5 and only one seta on posterior edge of article 6; article 2 of pereopod 5 broadly expanded, posteroventral corner quadrate, ventral edge horizontal and not extended downward, posterior margin with coarse serrations; dorsal carina and teeth commencing on pereonite 6, pereonites 6 and 7 and pleonites 1 and 5 with straight teeth, pleonites 2 and 3 with small reverted teeth, pleonite 4 lacking tooth; pleonite 4 with posteroventral tooth above insertion of uropod 1; posteroventral corners of pleonal epimera 1 and 2 rounded-quadrate, ventral margin of epimeron 3 convex, not strongly oblique, posteroventral corner with small, slightly upturned tooth, posterior edge long and slightly convex; epimera poorly setose; peduncle of uropod 1 with short lateral process, of uropod 2 with obsolescent process; telson cleft about halfway.

MALE.—Badly damaged; antenna 1 of typical male character, articles 1 and 2 subequal to each other in length, article 3 short, basal segments on flagellum coalesced and strongly setose posteriorly, accessory flagellum large, 3-articulate, article 3 minute; antenna 2 long (broken),

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article 5 much longer than 4; uropods stouter than in female; telson cleft halfway; pleonal epimeron 3 much deeper than in female, with long, oblique posterior edge below a medial quadrate cusp; tooth of pleonite 4 much longer than in female, pleonite 6 with vertically directed hump; pereopods in poor condition but article 2 of pereopod 5 apparently much broader than in female and not serrate posteriorly.

Remarks.—Female specimens generally badly damaged; telson and uropods reasonably well reconstructed but perhaps inaccurately illustrated; uropods 1 and 2 like those of male but more slender, outer ramus slightly longer on uropod 1 and peduncular process longer, outer rami uniarticulate; uropod 3 as slender as that of *Syrrhoites serrata* (Sars) with rami interequal in length and equal to peduncle, outer ramus apparently uniarticulate; maxillae 1 and 2 like those of *S. serrata*; mandible, lower lip and maxilliped generally like those of *S. serrata* but with small differences figured herein.

Holotype.—AHF No. 6020, female, 3.4 mm.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Material.—Stations 7229 (3 females), 7358 (1 male).

Relationship.—This species closely resembles *Syrrhoites pusilla* Enequist (1950) in its dorsal sculpture, rostrum, telson, and, in general, its uropods. Pereopods 1 and 2 of *S. cohasseta* have more setae on article 5 than on article 6. Mouthparts of *S. cohasseta* and *S. pusilla* are similar except for the longer articles 1 and 3 of the mandibular palp in *S. cohasseta*. The new species further differs from *S. pusilla* in the elongated article 3 of antenna 1 (female), by the elongated article 5 of gnathopod 2, the lack of a small, sharp projection on the first and second pleonal epimera, the more regular shape of pleonal epimeron 3 in both sexes, by the presence of lateral peduncular processes on uropod 1 and the longer fifth article of male antenna 2.

The long second gnathopod of *S. cohasseta* resembles that of *S. terceris* J. L. Barnard (1964b) but the shape of pleonal epimera 2 and 3, the more slender uropods and the elongated article 3 of female antenna 1 are characteristic of *S. cohasseta*.

The elongated article 3 of antenna 1 in *S. cohasseta* resembles that of *S. walkeri* Bonnier (1896) but the latter has a stout rostrum and very large teeth on pleonites 1–5. Males and females of *S. cohasseta*

←

Figure 85.—*Syrrhoites cohasseta*, new species, holotype, female, 3.4 mm, 7229: *a*, lateral aspect; *b–e*, pereopods 1,3,4,5, some broken; *f,g*, uropods 1,2, broken; *h*, gnathopod 1; *i*, antenna 2; *j*, lower lip; *k,l*, mandibles; *m*, maxillipedal outer plate and palp; *n*, distal cusp of article 1 of antenna 1; *o*, antenna 1; *p*, gnathopod 2. Male, 5.5 mm, 7358: *q*, telson; *r*, uropod 3, broken; *s*, head; *t*, mandibular palp; *u*, antenna 1; *v*, pleonites 3–6, left to right; *w*, antenna 2; *x*, part of pereopod 5.

have dimorphic first antennae but the elongated article 3 of female *S. walkeri* suggests that dimorphism is not unusual.

Syrrhoites cohasseta differs from *S. trux*, new species, in the absence of a tooth on pleonite 4, the smaller tooth of pleonite 3, the occurrence of distinct teeth on pleonites 1 and 2 and pereonites 6 and 7, and by the presence of a distinct cusp on pleonal epimeron 3.

Syrrhoites cohasseta is closely related to *S. dulcis*, new species, but differs in the thinner, more strongly downturned rostrum, the lack of a distinct tooth on pleonal epimeron 2, and the longer antenna 1.

The lack of a distinct tooth on pleonal epimeron 2, the slender gnathopods, the rostral shape and the long antenna 1 are characters distinguishing *S. cohasseta* from *S. silex*, new species.

Male *S. cohasseta* resembles the female of *S. redox*, new species, but differs by the occurrence of peduncular processes on uropods 1 and 2.

Distribution.—Middle Baja California, 1205–1720 m.

Syrrhoites dulcis, new species

Figure 86

Diagnosis of male.—Rostrum long, of medium thickness, projecting nearly horizontally; lateral cephalic lobes projecting slightly, irregularly truncate, anteroventral corners rounded; antennae slender but antenna 2 not elongated, articles 1 and 2 of antenna 1 interequal in length, article 3 half as long as 1 or 2, article 1 with 2 distal teeth hidden from lateral view; accessory flagellum 3-articulate, article 3 very short; gnathopods slender, article 5 of gnathopod 2 of medium elongation; anteroventral corner of coxa 1 rounded-quadrate, anterior edge deeply concave, posteroventral corner of coxa 3 rounded-quadrate, posterior edge scarcely excavate, coxa 4 with strongly oblique ventral (seemingly posterior) margin and scarcely any posteroventral protrusion; pereopods 1 and 2 with long setae on article 5 and only one or no seta on poseterior edge of article 6; article 2 of pereopod 5 very broadly expanded, posteroventral corner rounded-quadrate, ventral edge horizontal but extended downward to end of article 3, posterior edge with very fine serrations; dorsal carina weak, commencing on pereonite 3, becoming conspicuous on pereonite 7, not produced to teeth on pereonites 1–7, pleonites 1–5 with poorly projecting dorsoposterior teeth, tooth on pleonite 5 longest, straight, teeth of pleonites 2 and 3 scarcely upturned, very sharp; pleonite 4 with acute, upturned posteroventral tooth above insertion of uropod 1; posteroventral corner of pleonal epimeron 1 rounded, of 2 with medium-sized sharp tooth, of 3 with posterior portion of ventral margin obliquely beveled, posteroventrally produced to medium-sized sharp tooth, posterior edge short; epimera poorly or not setose; peduncle of uropod 1 with short

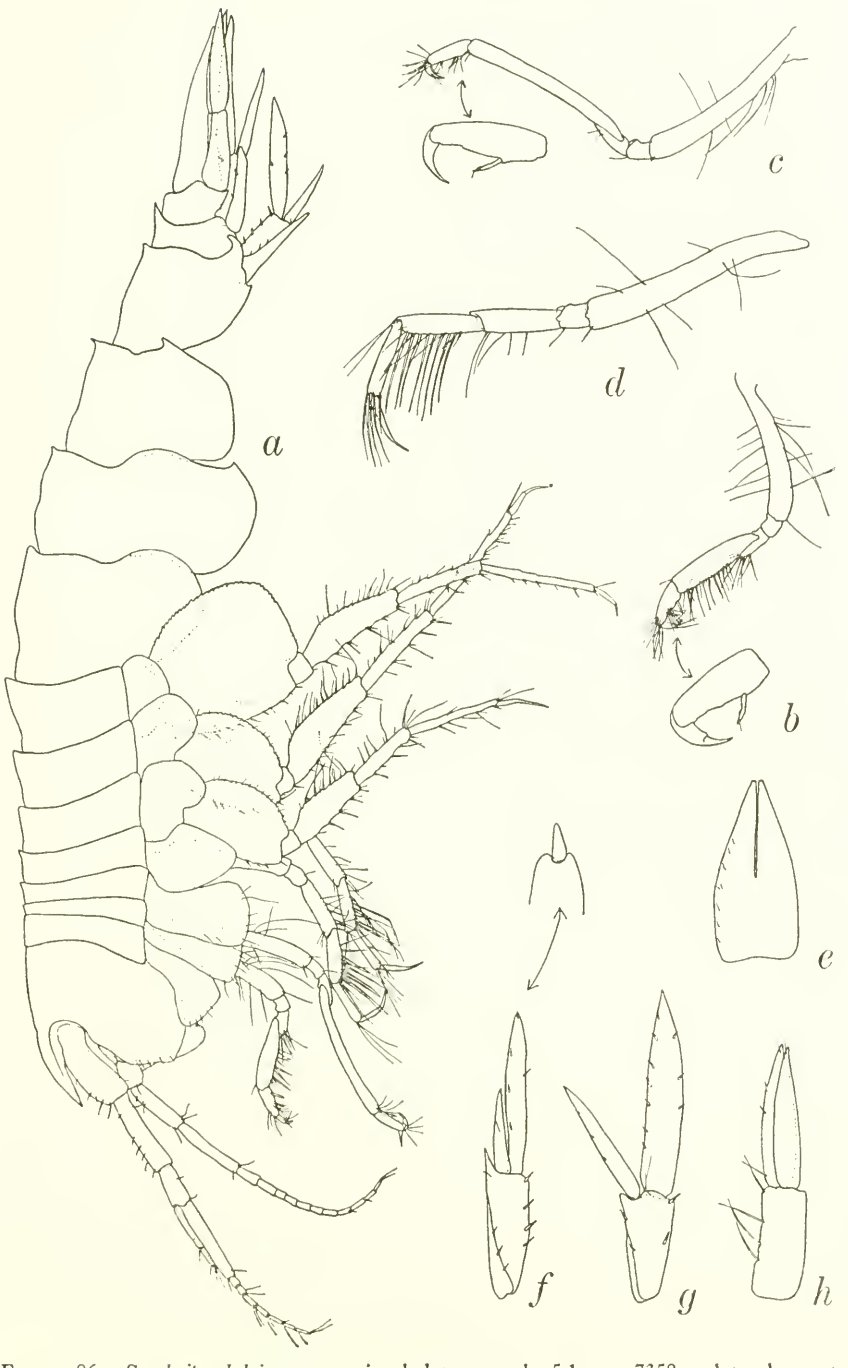

FIGURE 86.—*Syrrhoites dulcis*, new species, holotype, male, 5.1 mm, 7358: *a*, lateral aspect; *b,c*, gnathopods 1,2; *d*, pereopod 1; *e*, telson; *f–h*, uropods 1,2,3.

lateral process, of uropod 2 with obsolescent process; telson cleft about halfway.

Female.—Antenna 1 slightly longer than antenna 2, very slender, article 2 about 1.3 times as long as article 1, article 3 about 0.85 times as long as article 1, basal flagellar articles not coalesced.

Holotype.—AHF No. 6124, male, 5.1 mm.

Type-locality.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

Material.—25 specimens from the type-locality.

Relationship.—This species closely resembles *S. cohasseta*, new species, and might be a more fully developed male of that species although it differs from *S. cohasseta* in having a well-developed posteroventral tooth on pleonal epimeron 2, a shorter article 5 of gnathopod 2, a shorter cleft of the telson, a much broader, slightly more ventrally extended and more finely serrate lobe on article 2 of pereopod 5 and numerous other small differences, which may be seen by comparing the illustrations.

Syrrhoites pusilla Enequist (1950) has pleonites and epimera similar to those of *S. dulcis* but its rostrum is much longer and strongly downturned, it lacks a peduncular process on uropod 1, has a smaller coxa 4, a poorly developed tooth on pleonite 4 and a much larger tooth on pleonite 5. In the type-series of *S. cohasseta*, one specimen has the tooth of pleonite 5 poorly developed and another specimen has the tooth of pleonal epimeron 3 poorly developed.

Syrrhoites dulcis has many morphological similarities to *S. terceris* J. L. Barnard (1964b). Specimens of the latter species were in poor condition when described and the following characters may not have been assessed adequately: the occurrence of a process on urosomite 1 above the insertion of uropod 1, and the presence of a peduncular process on uropod 1. *Syrrhoites dulcis* differs from *S. terceris* in the shape of pleonal epimeron 3 (the latter species having an oblique ventral margin, a short posterior margin and a distinct tooth at the posteroventral corner), by the occurrence of a peduncular process on uropod 1, a process above the insertion of uropod 1, and the commencement of dorsal teeth on pereonite 3 instead of pereonite 5. No article 2 on the outer ramus of uropod 3 has been observed in *S. dulcis*.

Syrrhoites redox, new species

Figures 87, 88

Diagnosis of female.—Rostrum of medium length, slender apparently turned downwards slightly (reconstructed in illustration); lateral cephalic lobe broad, poorly projecting, smooth, rounded, anteroventral corner subacute; antennae moderately slender, antenna 2

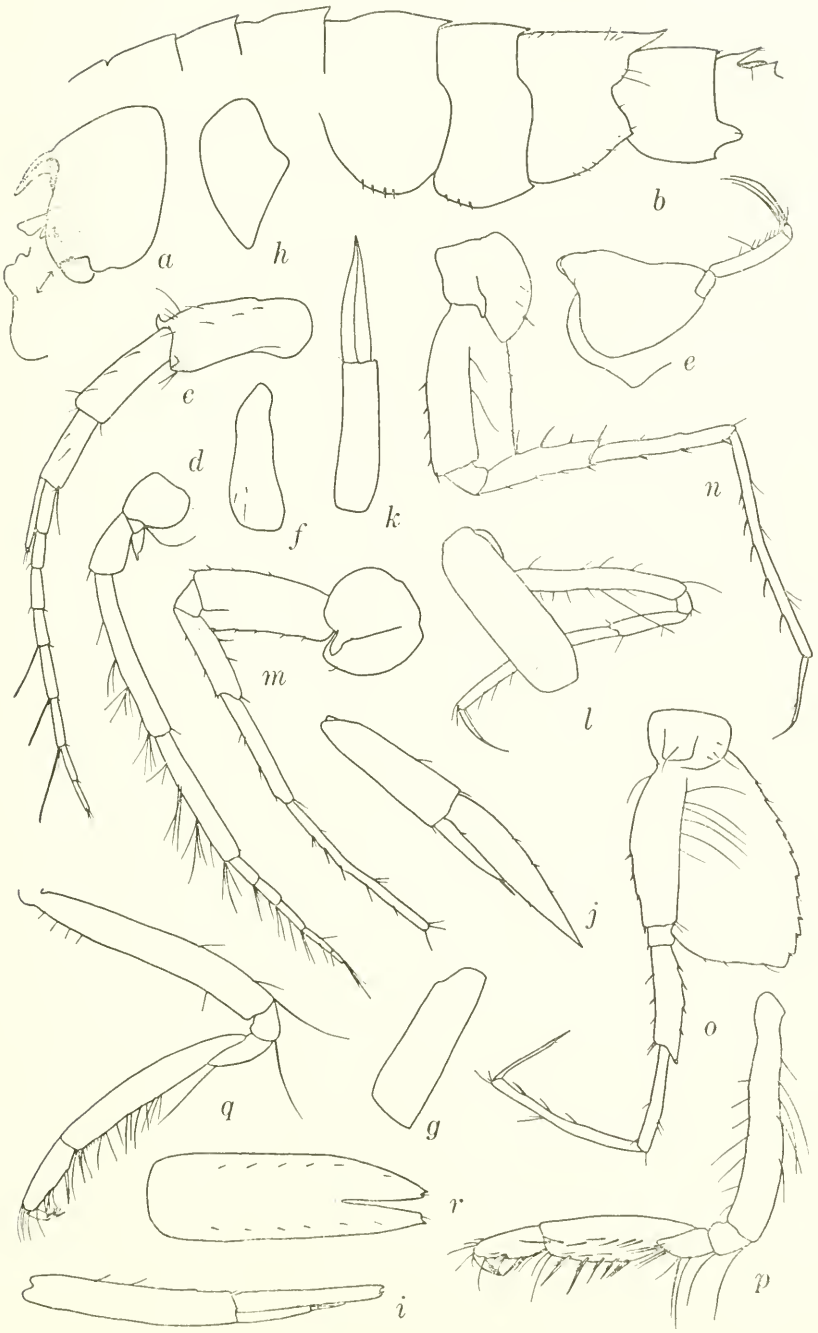

FIGURE 87.—*Syrrhoites redox*, new species, holotype, female, 3.1 mm, 7229: *a*, head, with offset enlarged outline of epistome-labrum complex hidden behind falconiform lateral cephalic lobe; *b*, outline of dorsal portion of pereonites 4–7, pleonal epimera 1–3 and pleonites 4–6; *c,d*, antennae 1,2, lateral; *e*, mandible; *f–h*, coxae 1,2,4; *i–k*, uropods 1,2,3; *l–o*, pereopods 1,3,4,5, coxa of pereopod 1 damaged; *p,q*, gnathopods 1,2; *r*, telson.

not elongated, articles 1 to 3 of antenna 1 peduncle consecutively slightly shorter, article 1 with mediodistal cusp and false laterodistal cusp faced laterally with chitinous lamina; accessory flagellum biarticulate, article 2 very short; gnathopods slender, article 5 of gnathopod 2 scarcely elongated; anteroventral corner of coxa 1 rounded,

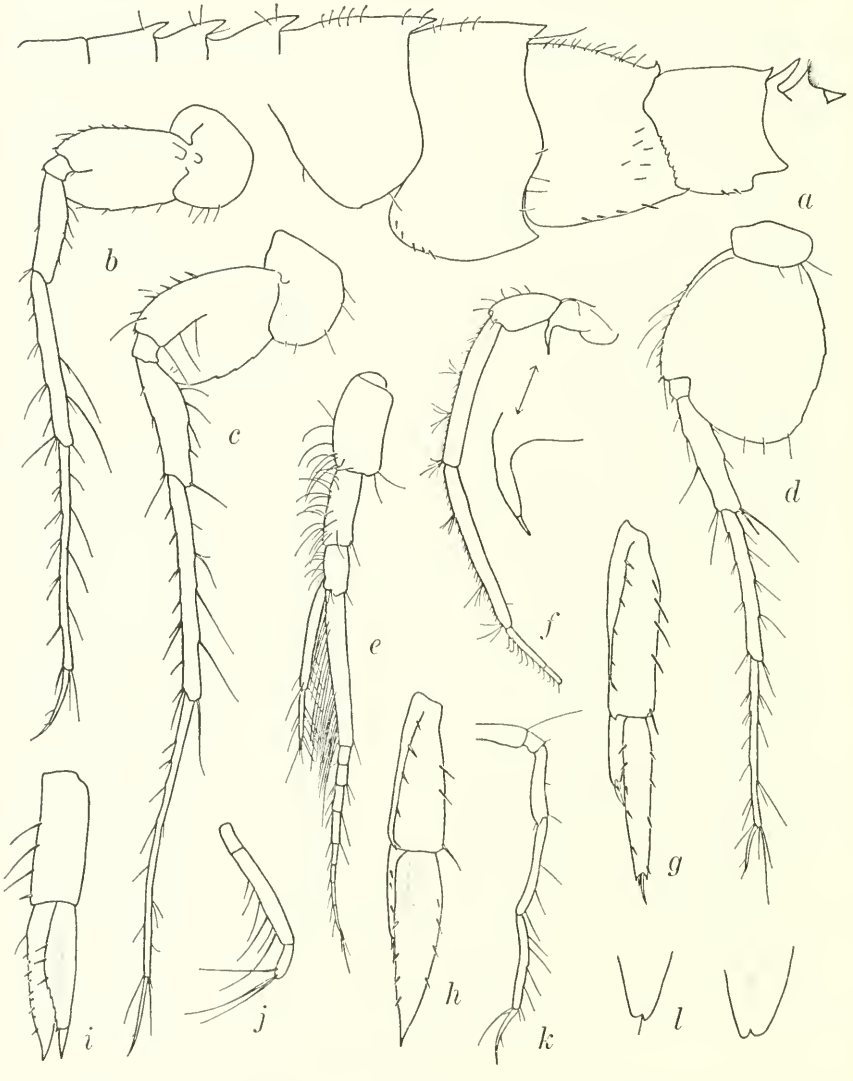

FIGURE 88.—*Syrrhoites ?redox*, new species, male, 5.0 mm, 7229:*a*, dorsal outline of pereonites 4–7, pleonal epimera 1–3 and pleonites 4–6; *b–d*, pereopods 3,4,5; *e,f*, antennae 1,2, medial; *g–i*, uropods 1,2,3; *j*, mandibular palp; *k*, pereopod 2, distal articles commencing with end of article 2; *l*, apices of telson.

anterior edge scarcely excavate, posteroventral corner of coxa 3 presumably rounded-quadrate (damaged), coxa 4 with slightly oblique ventral margin, posteroventral corner protruding, rounded; pereopods 1 and 2 with very few posterior setae on article 5, article 6 of pereropod 1 with three setae; article 2 of pereopod 5 strongly expanded, posteroventral corner of lobe quadrate, ventral margin horizontal and extended downward to article 3, posterior edge with coarse serrations; dorsal carina moderately weak, commencing on pereonite 5; pleonites 1–3 and 5 with medium-sized, thin, acute dorsoposterior teeth, pleonite 4 with obsolescent tooth, all teeth straight; pleonite 4 with posterolateral blunt tooth above insertion of uropod 1; posteroventral corner of pleonal epimeron 1 rounded, of epimeron 2 with medium-sized acute tooth, of 3 with small, weakly projecting acute tooth, posterior edge of epimeron 3 convex, of medium length, epimera all with 3–5 ventral spine-setae; peduncles of uropods 1 and 2 lacking lateral processes; telson cleft about one third of its length.

Remarks. Mandibular palp short, article 3 very short for genus, scarcely half as long as article 1; second articles of pereopods 3–5 narrow for genus, anterior and posterior margins parallel.

?Male.—Station 7229, 5.0 mm; peduncle of antenna 1 shorter and flagellum longer than in female, accessory flagellum 3-articulate; peduncle and flagellum of antenna 2 longer than in female, antenna 2 at least two thirds as long as body, gland-cone elongated and attenuated; mandibular palp article 3 longer and more slender than in female; pereopods 1 and 2 extremely slender but relatively similar in length to those of female; pereopods 3–5 slender and elongated, about 1.33 times as long as those of female; pereopod 4 much longer than pereopod 5; article 2 of pereopod 5 strongly expanded, posteroventrally subrounded, much broader than that of female, posterior serrations sparse and weak, dactyl relatively short; dorsal teeth of pereonites and pleonites, except pleonite 3, sharper and longer than those of female, pleonite 6 with erect, setose flange running circumferentially on dorsal surface, appearing acute from lateral aspect, pleonite 3 with small, acute, reverted dorsal tooth; posterior margin of pleonal epimeron 3 with about 10 irregular serrations; anteroventral margin of pleonal epimeron 1 with one serration and lacking those spines occurring on female.

Holotype.—AHF No. 6039, female, 3.1 mm.

Type-locality.—Station 7229, 27°54′25″ N, 115°40′00″ W, 1720–1748 m, Dec. 31, 1960.

Material.—The holotype and a male, 5.0 mm from the type-locality.

Relationship.—This species has its closest affinities with the Panamanian *Syrrhoites terceris* J. L. Barnard (1964b). The two species resemble each other in dorsal sculpture, pereopod 5, pleonal epimera, and uropodal peduncles; however, *S. terceris* has long fifth articles on the gnathopods, a deeply cleft telson, broader second articles of pereopods 3 and 4, a slightly longer article 3 of the mandibular palp and apparently no posterolateral process of pleonite 4, although the latter may have been overlooked on *S. terceris*.

Syrrhoites walkeri Bonnier (1896) has a broad article 2 on pereopods 3–5, a telson cleft halfway, an acute posterolateral process on pleonite 4, but it resembles *S. redox* in the short fifth articles of the gnathopods and in general sculpture, except for the absence of a tooth on pleonal epimeron 2.

The female of this species is closely related to *S. trux*, new species, but differs by the narrower second articles of pereopods 3 and 4, the posteroventrally quadrate article 2 of pereopod 5, the short cleft of the telson, the short article 3 of the mandibular palp, the shorter fifth articles of the gnathopods, the blunt, not acute, posterolateral process of pleonite 4, the subacute anterolateral cephalic corner and the absence of lateral peduncular processes on uropods 1 and 2.

Syrrhoites cohasseta, new species, resembles *S. redox* but has a smaller dorsal tooth on pleonite 3, no distinct posteroventral tooth on pleonal epimeron 2, a rounded (not quadrate) posteroventral corner of article 2 on pereopod 5 and also differs by the other characters mentioned above for *S. trux*.

Syrrhoites dulcis, new species, and *S. silex*, new species, have deep telsonic clefts, lateral uropodal processes, and broader second articles of pereopods 3 and 4 than does *S. redox*.

The male assigned provisionally to this species is so remarkably different from the female that its nomenclature must remain questionable until the life history of the species can be studied. The similarities of male and female in dorsal sculpture, pleonal epimera, head and telson justify the provisional assignment of the male to *S. redox*. Sexual dimorphism of antennae and pleonal processes occur in this genus and its relatives but the striking conditions of the dorsal tooth of pleonite 3, width and serrations of article 2 on pereopod 5, and the serrations occurring on pleonal epimeron 3 are distinctions of considerable magnitude.

This male resembles the female of *S. silex*, new species, in the occurrence of serrations on pleonal epimeron 3 but the dorsal tooth of pleonite 5 is especially incongruent, article 3 of the mandibular palp is particularly short in the male at hand, and *S. silex* has lateral peduncular processes on uropods 1 and 2. The shapes of the postero-

lateral process of pleonite 4, the elongation of pereopods 3–5 and the shapes of article 2 on pereopod 5 also demonstrate the relationship of this male to the female of *S. redox* and not to that of *S. silex*.

Article 2 on the outer ramus of uropod 3 was not observed in pristine condition in the two individuals of this species and is restored in the drawings.

Syrrhoites silex, new species

FIGURE 89

DIAGNOSIS OF FEMALE.—Rostrum of medium length, slender, nearly horizontal; lateral cephalic lobe broadly rounded, poorly projecting, smooth, anteroventral corner rounded; antennae of medium thickness, antenna 2 not elongate, article 2 of antenna 1 longer than article 1, article 3 slightly shorter than article 1, mediodistal end of article 1 with complex cuspidation; accessory flagellum biarticulate, article 2 very short; gnathopods of medium thickness, article 5 of gnathopod 2 scarcely elongated; anteroventral corner of coxa 1 rounded-quadrate, anterior margin scarcely excavate, posteroventral corner of coxa 3 rounded-quadrate, posterior margin scarcely excavate, coxa 4 with very oblique ventral (seemingly posterior) margin, posteroventral corner scarcely protruding, rounded-quadrate; pereopods 1 and 2 with very few posterior setae on articles 5 and 6; article 2 of pereopod 5 poorly expanded for genus, tapering distally, posteroventral corner quadrate-subacute, extended nearly to end of article 3, ventral margin slightly oblique and short, posterior edge with fine serrations; dorsal carina moderately weak, commencing about on pereonite 2, pereonites 5–7 and pleonites 1 and 2 with distinct posteriorly directed, blunt posterodorsal teeth, pleonite 3 with retrorse, acute dorsal tooth, pleonite 4 with elevated but weak quadrate tooth, pleonite 5 with short, thick tooth; pleonite 4 with posterolateral, acutely upturned, thick tooth; posteroventral corner of pleonal epimeron 1 rounded, of epimeron 2 with sinuous posterior margin and short, broad, acute posteroventral tooth, of epimeron 3 with small, narrow, sharp tooth, above which posterior margin straight and furnished with two large serrations nearly as large as posteroventral tooth; only epimeron 2 with four conspicuous spines; peduncle of uropod 1 with medium-sized lateral process, of uropod 1 with small process; telson cleft nearly two thirds of its length.

MALE.—An immature male has basal flagellar article of antenna 1 elongated slightly as seen in the accompanying figure.

HOLOTYPE.—AHF No. 6120, female, 3.7 mm.

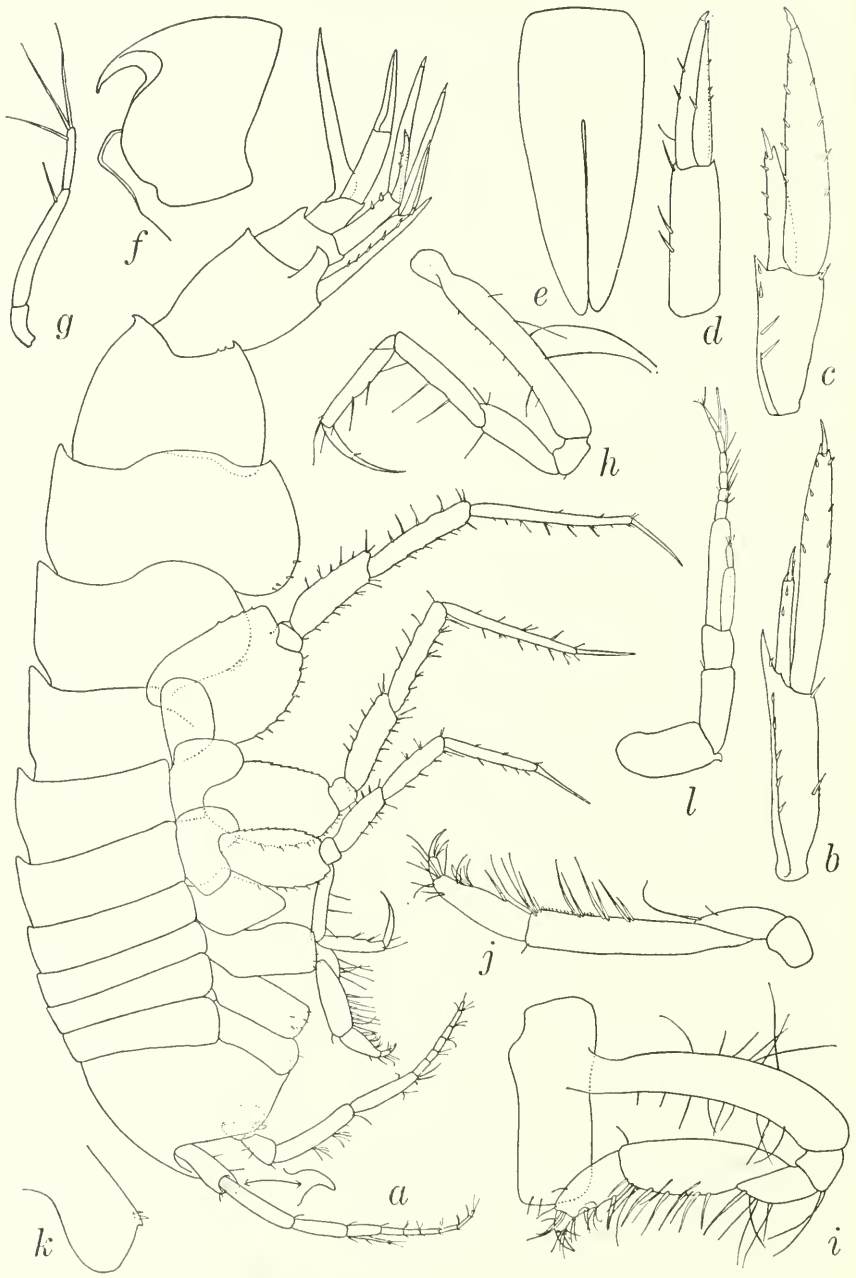

FIGURE 89.—*Syrrhoites silex*, new species, holotype, female, 3.7 mm, 7358: *a*, lateral aspect; *b–d*, uropods 1,2,3; *e*, telson; *f*, head; *g*, mandibular palp; *h*, pereopod 1; *i,j*, gnathopods 1,2; *k*, inner plate of maxilliped. Male, 3.7 mm: *l*, antenna 1.

Type-locality.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

Material.—Stations 7234 (2), 7358 (6).

Relationship.—*Syrrhoites silex* appears to have close affinities with *S. sorpresa* (J. L. Barnard, 1962a) but differs by its smaller dorsal segmental teeth. It differs from *S. dulcis*, new species, in the more distinct teeth of pereonites 5–7, by the shallower extent of pleonal epimeron 3, and the occurrence of its tooth at the normal posteroventral corner instead of on the beveled posterior margin, by the stouter gnathopods and the stouter second articles of pereopods 3–5.

This species differs from *S. trux*, new species, by the stouter gnathopod 1, the distinct teeth of pereonites 5–7, the presence of a tooth on pleonal epimeron 3, and the narrower second articles of pereopods 3–5.

The mouthparts of *S. silex* are generally like those of *S. serrata* (Sars, 1895, pl. 137) except for the mandibular palp shown herein and the mediodistal corner of the inner plate of the maxilliped and palp articles 3 and 4 of the maxilliped. The lower lip is like that of *S. trux*, new species. Biarticulation on the outer ramus of uropod 3 is unclear.

Distribution.—Middle Baja California, 842–1095 m.

Syrrhoites trux, new species

Figures 90, 91

Diagnosis of female.—Rostrum long, thick, slightly curved downwards; lateral cephalic lobe extended forward moderately, broadly truncated, anteroventral corner rounded-quadrate; antennae slender, antenna 2 not elongated, articles 1, 2, and 3 subequal in length to each other, mediodistal end of article 1 with retroverted cusp, accessory flagellum biarticulate, article 2 very short; gnathopods slender, elongated; anteroventral corner of coxa 1 rounded-subacute, anterior edge strongly concave, posteroventral corner of coxa 3 rounded-quadrate, posterior margin scarcely excavate, coxa 4 with moderately oblique ventral edge, posteroventral corner subacute, protruding moderately; pereopods 1 and 2 with strongly setose posterior margins of articles 5 and 6; article 2 of pereopod 5 of medium expansion, ovate, posterior, and ventral margins merging, rounded posteroventrally and scarcely extended downward, posterior serrations of medium size; dorsal carina essentially commencing on pleonite 1, pleonites 1 and 2 with elevated subquadrate posterodorsal corners, pleonite 3 with long, thick, acutely tapering tooth, pleonite 4 with small, slightly erect, acute tooth, pleonite 5 with slender, horizontal, acute tooth; pleonite 4 with thin, acute posterolateral process above insertion of uropod 1; pleonal epi-

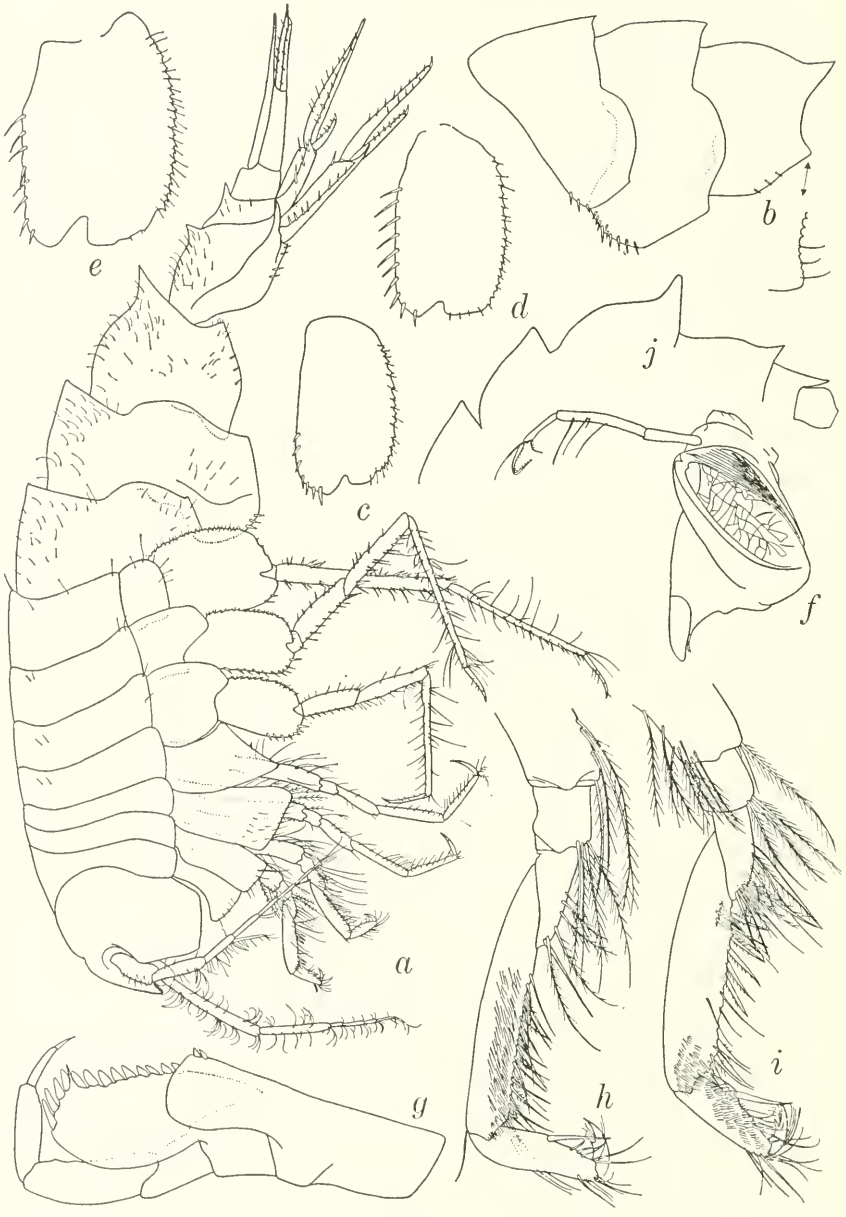

FIGURE 90.—*Syrrhoites trux*, new species, holotype, female, 7.4 mm, 7358: *a*, lateral aspect; *b*, pleonal epimera 1–3, left to right; *c–e*, article 2 of pereopods 3,4,5; *f*, mandible; *g*, maxilliped; *h,i*, gnathopods 2,1. Male 5.4 mm, 7234; *j*, dorsal outline of pleonites 1–6, left to right.

meron 1 with strongly convex posterior margin and small, scarcely projecting posteroventral tooth, epimeron 2 with obtusely quadrate posteroventral corner, epimeron 3 with quadrate posteroventral corner, posterior margin very short, epimera 2 and 3 very minutely serrate,

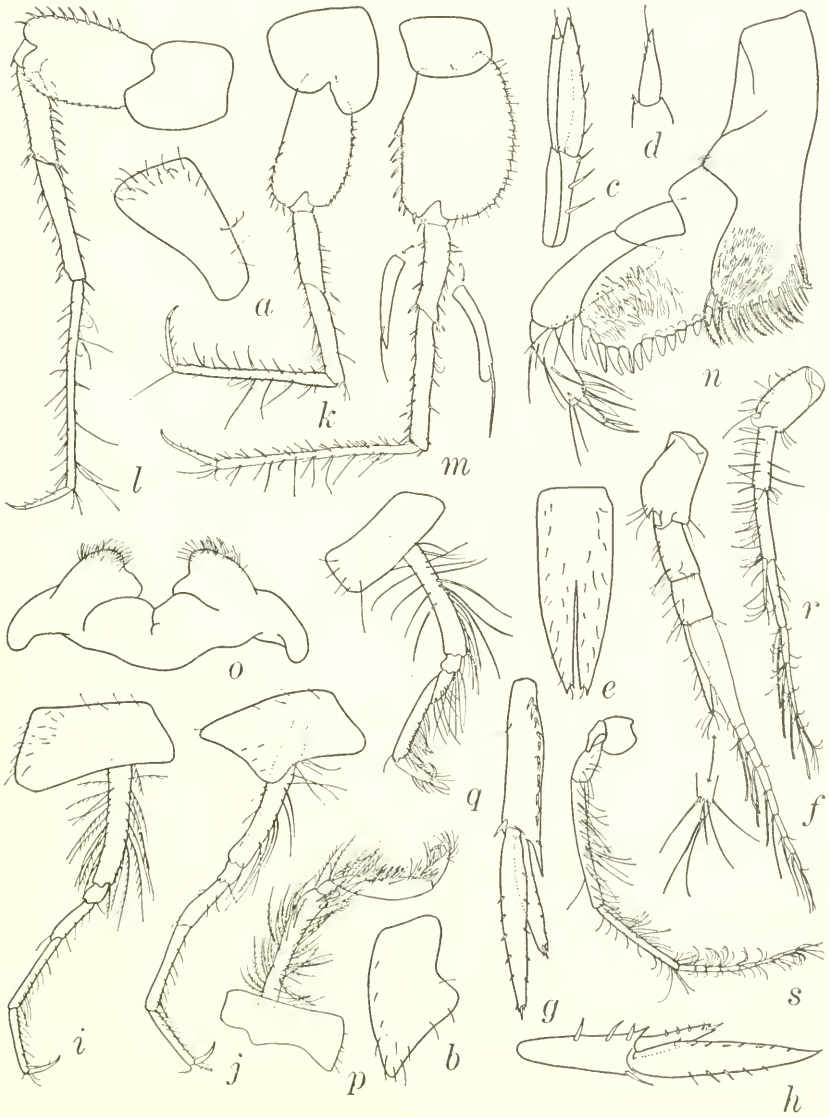

FIGURE 91.—*Syrrhoites trux*, new species, male, 5.4 mm, 7234: *a,b*, coxae 3,4; *c*, uropod 3; *d*, article 2 of outer ramus of uropod 3; *e*, telson; *f*, antenna 1; *g,h*, uropods 1,2. Holotype, female, 7.4 mm, 7358: *i–m*, pereopods 1,2,3,4,5; *n*, maxilliped; *o*, lower lip; *p,q*, gnathopods 1,2; *r,s*, antennae 1,2.

each epimeron with three or more stout ventral spines; pleon conspicuously setose; uropod 1 with medium-sized lateral process on penduncle, uropod 2 with small process; telson cleft slightly more than halfway.

Male.—Accessory flagellum longer than that of female, basal portion of primary flagellum unsegmented; tooth of pleonite 5 larger than in female.

Holotype.—AHF No. 6125, ovigerous female, 7.4 mm.

Type-locality.—Station 7358, 27°35′45″ N, 115°08′30″ W, 1095–1205 m, Apr. 21, 1961.

Material.—Stations 7234 (8), 7358 (1).

Relationship.—*Syrrhoites walkeri* Bonnier (1896), in view of its dorsal sculpture, pleonal epimera, telson, head, coxae, and pereopods 3–5, may be the species most closely related to *S. trux*. *Syrrhoites trux* differs from *S. walkeri* in the slightly quadrate [not rounded] posteroventral corner of pleonal epimeron 2, the slight tooth of the posteroventral corner of epimeron 1, and the absence of any dorsal teeth on pereonites 5–7. The two species are the most closely related pair in the genus and may belong together as subspecies. *Syrrhoites walkeri* was described from the north Atlantic Ocean in a depth of 950 meters.

Syrrhoites terceris J. L. Barnard (1964b), of Pacific Panama, is a near relative of *S. trux*, but the latter differs from *S. terceris* in the absence of distinct pereonal teeth, the larger dorsal teeth of the pleon, the stouter gnathopod 1, the different shape of the pleonal epimera, and the narrower article 2 of pereopod 5.

The dorsal portions of the pereonites of *S. trux* interlock together so that no posterodorsal margins are freely movable. *Syrrhoites trux* is especially characterized by the nonarticulate spinelike cusp on the outer plates of the maxillipeds.

Distribution.—Middle Baja California, 842–1095 m.

Vitjazianidae

Vemana J. L. Barnard

Vemana lemuresa, new species

Figure 92

Diagnosis.—Pleonal epimeron 3 produced into large tooth at posteroventral corner; coxa 1 acutely produced anteriorly; gnathopod 1 with sinuous posterior margin on article 6 representing condition of near subchelateness, with setal armament denoting palmar region; coxae 4–7 smaller than in other known species of the genus and with large

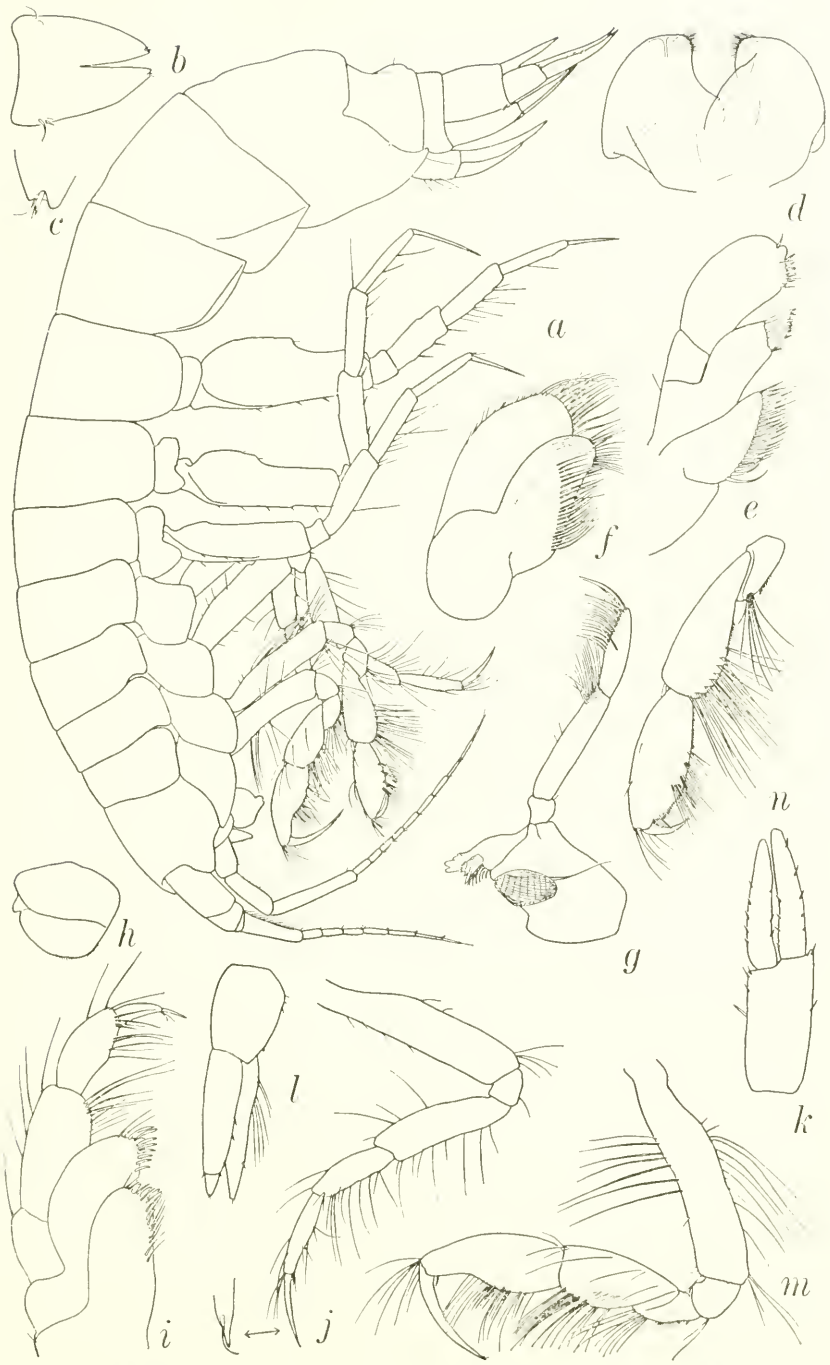

FIGURE 92.—*Vemana lemuresa*, new species, holotype, female, 10.0 mm, 7249: *a*, lateral aspect; *b*, telson; *c*, apex of telsonic lobe; *d*, lower lip; *e,f*, maxillae 1,2; *g*, mandible; *h*, labrum; *i*, maxilliped; *j*, pereopod 1; *k,l*, uropods 2,3; *m,n*, gnathopods 1,2.

gaps between them; pereopod 5 as long as pereopod 4, article 2 slender, medially constricted on posterior border with distal half of article 2 narrower than proximal half; pleonite 4 with small dorsal hump; peduncle of uropod 2 poorly spiniferous compared with other species.

Holotype.—AHF No. 6113, female, 10.0 mm.

Type-locality.—Station 7249, 27°36′25″ N, 115°56′25″ W, 3705–3745 m, Jan. 4, 1961.

Materials.—Stations 7228 (male, 8.8 mm), 7249 (holotype).

Relationship.—This species resembles *Vemana lizata* J. L. Barnard (1964b) more closely than it does *V. compressa* J. L. Barnard (1964b) because of the shape of pleonal epimeron 3. That of *V. compressa* is rounded-quadrate at the posteroventral corner. *Vemana compressa* and *V. lizata* are the only other known members of the genus, both occuring in the Caribbean Sea. *Vemana lemuresa* differs from *V. compressa* and *V. lizata* in the narrower article 2 of pereopod 5 and its posteromedial constriction, and the much better developed, nearly subchelate gnathopod 1. Coxa 1 is even more acute anteriorly than that of *V. lizata* and coxae 4–7 are much smaller than those of *V. compressa*.

The outer lobe of maxilla 1 of *V. lemuresa* has nine spines and the accessory flagellum resembles that of the other known species. The male is identical to the female except that a dorsolateral ridge sharply defines the dorsal hump of pleonite 4. Undescribed parts are shown in the figures.

Distribution.—Middle Baja California, 3718–3745 m.

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